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OF THE

TORREY BOTANICAL CLUB

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The Hepaticae of Bermuda

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(WITH PLATE 6)

Very little has been published on the hepatic flora of Bermuda. A short list by Mitten,* which appeared over twenty years ago, and a few scattered references of later date apparently include everything. In Mitten's list only six species are recorded. These were all collected by Mr. H. N. Moseley, one of the botanists of the Challenger Expedition, although one of the species noted had been previously found by Governor Lefroy. They are listed under the following names: *Aneura palmata*, *Cephalozia connivens*, *Dumortiera hirsuta*, *Otiona Aitonia*, *Pleuroschisma prostratum* and *Radula pallens*. Of these species the *Aneura* (or *Riccardia*) *palmata* is marked with an interrogation-point, the determination having been based on poor and sterile material. Since *R. palmata* is a species with a distinctly northern distribution, it would hardly be expected in Bermuda and is therefore omitted from the list which follows. It is possible that the specimens in question ought to have been referred to *R. latifrons* instead. Of the remaining five species two require a word of explanation. *Pleuroschisma prostratum* is of course a synonym of *Odontoschisma prostratum*, and Dr. M. A. Howe kindly reports that the sterile specimens of *Otiona Aitonia* preserved at Kew really represent the common *Reboulia hemisphaerica*. These five species have all been brought from Bermuda by later collectors.

* Challenger Rep. Botany 1^2: 92, 93. 1884. — The same list, with the exception of *Radula pallens*, was originally published by Mitten in Jour. Linn. Soc. Bot. **15**: 61. 1876.

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Within the past few years three additional species have been recorded. Two of these, *Cephalozia divaricata* and *Telaranea nematodes*, are mentioned by Howe, who also confirms the presence of *Cephalozia connivens* on the Island.* The third species, *Cololejeunea Jooriana*, is noted by the writer.† Eight hepatics in all, therefore, according to the published records, are satisfactorily known from Bermuda.

The present paper is based on six recent collections and increases the number of known species to twenty-three. These collections are as follows: 1. Four species, found by Professor W. G. Farlow in January 1900; 2. Nineteen species, found by Dr. M. A. Howe in July 1900; 3. Five species, found by Mrs. Helen M. Norcross in 1901; 4. One species, found by Professor W. R. Coe in 1903; 5. One species, found by Miss L. DeF. Haynes in 1903; and 6. Fifteen species, found by Mrs. N. L. Britton in 1905. Although it is probable that other species remain to be discovered, these collections doubtless include most of the conspicuous forms and give a fairly complete representation of the hepatic flora as a whole.

MARCHANTIACEAE

1. REBOULIA HEMISPHAERICA (L.) Raddi. Without definite locality (*Moseley*). On stone walls (*Farlow*). On stones in a cemetery, Hamilton (*Howe*). On shaded walls, Hamilton and Paget Parish (*Howe*). Paynter's Vale (*Mrs. Norcross*). Roadside bank, North Side (*Mrs. Britton*).

2. LUNULARIA CRUCIATA (L.) Dumort. At base of walls, Hamilton (*Howe*).

3. DUMORTIERA HIRSUTA (Sw.) Nees. Without definite locality (*Moseley*). On rocks, Church Cave (*Howe, Mrs. Britton*).

4. MARCHANTIA POLYMORPHA L. Without definite locality (*Miss Haynes*).

METZGERIACEAE

5. RICCARDIA LATIFRONS Lindb. Devonshire Marsh (*Howe, Mrs. Britton*).

* Bull. Torrey Club **29**: 282, 286. 1902.

† Mem. Torrey Club **8**: 174. 1902.

6. RICCARDIA MULTIFIDA (L.) S. F. Gray. Devonshire Marsh (*Mrs. Britton*).

7. METZGERIA CONJUGATA Lindb. On rocks, Church Cave (*Howe*). Walsingham (*Mrs. Norcross*). The specimens are all sterile, and the determination is therefore somewhat doubtful.

8. PALLAVICINIA LYELLII (Hook.) S. F. Gray. Devonshire Marsh (*Farlow, Howe, Mrs. Britton*). Paget Marsh (*Mrs. Britton*).

JUNGERMANNIACEAE

9. PLAGIOCHILA SMALLII Evans. In a cave, Paynter's Hill (*Howe*). Paynter's Vale (*Mrs. Britton*).

10. CEPHALOZIA CONNIVENS (Dicks.) Lindb. Without definite locality (*Moseley*). Devonshire Marsh (*Howe, Mrs. Britton*).

11. CEPHALOZIA DIVARICATA (Sm.) Dumort. Devonshire Marsh (*Farlow, Howe*).

12. ODONTOSCHISMA PROSTRATUM (Sw.) Trevis. Without definite locality (*Moseley*). Devonshire Marsh (*Howe, Mrs. Britton*).

13. KANTIA TRICHOMANIS (L.) S. F. Gray. On old stump of *Osmunda*, Devonshire Marsh (*Mrs. Britton*).

14. TELARANEA NEMATODES (Gottsche) M. A. Howe. Devonshire Marsh (*Howe*).

15. RADULA PALLENS (Sw.) Nees. Without definite localities (*Lefroy, Moseley*). On rocks, Church Cave (*Howe, Mrs. Britton*). On rocks in a cave, Paynter's Hill (*Howe*). Walsingham and Paynter's Vale (*Mrs. Norcross*).

16. COLOLEJEUNEA JOORIANA (Aust.) Evans. On trees, Paynter's Hill and Devonshire Marsh (*Howe*). A few specimens only.

17. COLOLEJEUNEA MINUTISSIMA (Sm.) Schiffn. On buttonwood, Devonshire Marsh (*Howe*). On *Celtis*, Walsingham Caves (*Mrs. Britton*).

18. LEJEUNEA GLAUCESCENS Gottsche. On stones, Walsingham (*Howe, Mrs. Norcross, Mrs. Britton*). On rocks, Church Cave (*Howe*). Gully, Tuckerstown (*Mrs. Britton*).

19. RECTOLEJEUNEA PHYLLOBOLA (Nees & Mont.) Evans. Devonshire Marsh (*Farlow*). On trees, Church Cave, Walsingham and Paynter's Hill (*Howe*). On sticks and shrubs, near Walsingham Caves (*Howe*). On trees, Walsingham Caves (*Mrs. Norcross, Mrs. Britton*).

20. EUOSMOLEJEUNEA OPACA (Gottsche) Steph. On trees and rocks, Paynter's Hill (*Howe*).

21. CROSSOTOLEJEUNEA BERMUDIANA sp. nov. (see description below). On the ground and on rocks, Flatts (*Coe*). Paynter's Vale (*Mrs. Britton*).

22. JUBULA PENNSYLVANICA (Steph.) Evans. Paynter's Hill (*Howe*). A few sterile fragments only, but apparently referable to this species.

23. FRULLANIA SQUARROSA (R. Bl. & N.) Dumort. On roots of mangrove, Walsingham (*Howe*). Cave, Paynter's Vale (*Mrs. Britton*).

It will be seen from the species listed that over 65 per cent. are *Jungermanniaceae* and that the others are equally divided between the *Marchantiaceae* and the *Metzgeriaceae*. The *Ricciaceae* are as yet unrepresented. Of the *Jungermanniaceae* more than half belong to the *Jubuleae*.

The flora on the whole is most closely related to that found in the eastern part of North America, thirteen species being common to Connecticut and the same number to Florida. At the same time it will be noted that twelve of the species occur in the British Isles and that about as many have been reported from the West Indies. If, however, species are excluded which are almost cosmopolitan, such as *Marchantia polymorpha* and *Reboulia hemisphaerica*, it will be found that the others are nearly all distinctly southern or even tropical in their distribution. The subtropical character of the flora is also illustrated by the relatively large number of the *Jubuleae*.

Crossotolejeunea bermudiana sp. nov.

Yellowish-green, varying to pale-green and becoming brownish with age, growing in depressed tufts: stems 0.08 mm. in diameter, prostrate and loosely adherent to the substratum, sparingly and irregularly branched, the branches widely spreading: leaves distant to loosely imbricated, the lobe widely spreading, more or less convex and sometimes inflexed at the apex, falcate, 0.5 mm. long, 0.4 mm. wide, outer portion broadly orbicular-ovate, abruptly dilated from a narrow basal region, antical margin straight or slightly incurved near the base, then strongly outwardly curved to the apex, arching partially or wholly across axis, postical

margin also more or less curved, apex broad, usually abruptly acute or apiculate, whole margin (except close to the antical base) minutely crenulate from projecting cells; lobule ovoid, 0.17 mm. long, 0.1 mm. wide, inflated throughout, keel strongly arched, forming an angle of about 90° with the postical margin of lobe, free margin involute to beyond the apex, sinus straight to lunulate, apical tooth blunt and straight, bearing a hyaline papilla at its proximal base; cells of lobe averaging 17 μ at the margin, 25 × 19 μ in the middle and 35 × 23 μ at the base, more or less convex, walls thin, trigones and the rather numerous intermediate thickenings small but usually distinct, cuticle smooth, ocelli none: underleaves distant, orbicular, 0.15 mm. long, bifid about one half with erect, obtuse, acute or apiculate divisions and a narrow, acute or obtuse sinus, margin everywhere crenulate from projecting cells, sometimes obscurely and bluntly unidentate on the sides: inflorescence autoicous: ♀ inflorescence sometimes on a very short branch (with a single rudimentary leaf besides the bracts), sometimes on a leading branch, innovating on one side, rarely on both, the innovations usually sterile; bracts erect-spreading, the lobe ovate to obovate, 0.55 mm. long, 0.3 mm. wide, apex obtuse to acute or apiculate, margin sparingly and irregularly angular-dentate, otherwise crenulate, lobule ligulate, 0.4 mm. long, 0.08 mm. wide, mostly blunt at apex, crenulate; bracteole slightly connate on one side, ovate, 0.5 mm. long, 0.3 mm. wide, bifid about two fifths with erect and acute divisions separated by a narrow sinus, margin as in the bracts; perianth about half exserted, not compressed, oblong-obovoid from a somewhat narrowed base, 0.8 mm. long, 0.35 mm. in diameter, broad and truncate at the apex with a short beak, sharply five-keeled, the keels narrowly and obsoletely bialate in the upper part, the wings crenulate or denticulate from projecting cells, rarely with a few teeth two cells long in the apical region: ♂ inflorescence occupying a short branch; bracts in two or three pairs, closely imbricated, strongly inflated, slightly and subequally bifid with blunt to subacute divisions; bracteole present at base of spike, similar to the underleaves but smaller; antheridia in pairs: mature sporophyte not seen. (PLATE 6.)

The specimens from Flatts may be considered the type.

Except for the five-keeled perianth, this new species has much in common with the genus *Prionolejeunea*. The leaves, the leaf-cells and the underleaves are very similar, and the lobule is constructed on the same plan, bearing a hyaline papilla at the proximal base of the apical tooth; the latter, however, is straight instead of curved, and the papilla is in a distinct depression.

The genus *Crossotolejeunea* is largely if not wholly confined to the American tropics and includes about a dozen species. The type is *C. Boryana* (Mont.) Schiffn., which is of about the same size as *C. bermudiana* and which agrees with it also in its autoicous inflorescence. The leaves of *C. Boryana*, however, are more densely imbricated, the apex of the lobe is acuminate and usually reflexed, the leaf-cells are minutely verruculose, the apical cell of the lobule is more curved and can usually be seen without dissection, the underleaves are larger, with narrow acuminate divisions, sharply unidentate on the sides, the perichaetial bracts and bracteoles are usually more sharply toothed, and the wings of the perianth are spinose or incised-serrate.

C. paucispina (Spruce) Steph.,* a species first described from Brazil but afterwards recorded from Guadeloupe, is even more closely related. Through the kindness of Mr. M. B. Slater, of Malton, Yorkshire, the writer has been enabled to study a portion of the type material of this species from the Spruce herbarium. It agrees with *C. bermudiana* in general appearance and in most of the characters derived from the lobes, lobules and leaf-cells. It is, however, somewhat more robust, the leaves measuring about 0.75 mm. in length and the broadly orbicular underleaves about 0.25 mm. The leaf-cells also are a trifle larger and are very minutely verruculose, although described as smooth by Spruce. The underleaves are more deeply bifid, with acuminate and often connivent divisions, and the perianth is slightly compressed and only four-keeled, the antical face being plane. According to Spruce the keels bear a few deciduous spines in the upper part, but this could not be demonstrated in the material examined by the writer.

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* Hedwigia 35: 76. 1896. (*Lejeunea paucispina* Spruce, Hep. Amaz. et And. 163. 1884).

Explanation of plate 6

Crossotolejeunea bermudiana Evans

FIG. 1. Part of plant showing male inflorescence and female branch with perianth and young sporophyte, postical view, × 40.

FIG. 2. Leading branch with female inflorescence, postical view, × 40.

FIG. 3. Two leaves, antical view, × 40.

FIG. 4. Cells from middle of lobe, × 300.

FIG. 5. Cells from antical margin of lobe, × 225.

FIG. 6. Apex of lobe, × 225.

FIG. 7. Apex of lobule, × 225.

FIGS. 8, 9. Apices of underleaf-divisions, × 225.

FIGS. 10, 11. Bracts and bracteole from the same involucre, × 40.

FIGS. 12–14. Bracts and bracteole from another involucre, × 40.

FIG. 15. Transverse section of perianth, × 40.

FIG. 16. Antical keel of perianth in transverse section, × 225.

The figures were all drawn by the writer from the type specimens, and prepared for publication by Miss Hyatt.

Studies on the Rocky Mountain flora — XVI

PER AXEL RYDBERG

Salix Watsonii (Bebb) Rydb.

Salix cordata Watsonii Bebb, Bot. Calif. **2**: 86. 1880.
Salix flava Rydb. Bull. Torrey Club **28**: 273. 1901. Not *S. flava* Schoepf. 1796.

Chenopodium oblongifolium (S. Wats.) Rydb.

Chenopodium leptophyllum oblongifolium S. Wats. Proc. Am. Acad. **9**: 95. 1873.

Atriplex subspicata (Nutt.) Rydb.

Chenopodium subspicatum Nutt. Gen. Am. **1**: 199. 1818.
Atriplex patula subspicata S. Wats. Proc. Am. Acad. **9**: 107. 1873.

Rumex praecox Rydb. sp. nov.

Perennial with a thick fleshy rootstock; stem 2–3 dm. high, striate; basal leaves petioled, rather thick; petioles 5–10 cm. long; blades oval or elliptic, 4–10 cm. long, 2–4 cm. wide, rounded at both ends; stem-leaves similar, but smaller, short-petioled and more acute; flowers perfect, in terminal and axillary panicles; perianth-lobes oval, rounded at the apex; the outer 1.5 mm., when fully developed about 3 mm. long, the inner 3–5 mm., without tubercles; fruit developed before the perianth-lobes become much enlarged, shining.

This species is related to *R. occidentalis*, but is characterized by its fleshy tuber-like rootstocks and its precocious fruiting.

COLORADO: Grayback mining camps, 1900, *Rydberg & Vreeland 6328* (type); Bob Creek, La Plata Mountains, 1898, *Baker, Earle & Tracy 270*.

Paronychia brevicuspis (A. Nels.) Rydb.

Paronychia sessiliflora brevicuspis A. Nels. Bull. Torrey Club **26**: 237. 1899.

LIMNIA L. (Kongl. Sv. Vet. Ak. Hand. **1746**: 130. 1746); Haw. Syn. Pl. Succ. 11. 1812.

Greene, Howell and Robinson have transferred a number of species from *Claytonia* to *Montia*; but none of them has given any obvious reason. Dr. Greene satisfied himself by transferring the sections ALSINASTRUM, NAIOCRENE and MONTIASTRUM. These evidently come nearest to *Montia* of all the sections of *Claytonia*. Prof. Howell, followed by Dr. Robinson, also transferred the section LIMNIA, and the rhizomatous species of EUCLAYTONIA of Gray. The difference between the two genera *Claytonia* and *Montia* as now limited is practically reduced to the number of ovules; 6 in the former, 3 in the latter. In *Montia* we find now both regular and irregular flowers, free petals and partly united petals, 5 stamens and 3 stamens, opposite stem-leaves and alternate stem-leaves, annuals and perennials, and of the latter several kinds, viz., with horizontal rootstocks, with short stolons bearing offsets, with slender runners bearing cormlets at the ends, or with axillary bulblets. In the olden time, *Montia* was easily distinguished from *Claytonia* by its gamopetalous corolla cleft on one side. It may be that all the sections mentioned above should be removed from *Claytonia*, but they should not be transferred to *Montia*, making this genus more unnatural than *Claytonia* ever was. I think that in a family like *Portulacaceae*, in which the modifications in the flowers are so slight, generic characters should to some degree be sought in the general habit. Instead of transferring the sections to *Montia* it would have been better to restore the Linnaean genus *Limnia* (which was adopted by Haworth), and to include in it all the American species of *Montia*, except *M. fontana*; or else to continue the splitting and propose several new genera. The typical Rocky Mountain species of *Limnia* are the following:

Limnia asarifolia (Bong.) Rydb.

Claytonia asarifolia Bong. Veg. Sitcha 137. 1831.

LIMNIA SIBIRICA (L.) Haw. Syn. Pl. Succ. 11. 1812.

Claytonia sibirica L. Sp. Pl. 204. 1753.

Limnia arenicola (Henderson) Rydb.

Claytonia arenicola Henderson, Bull. Torrey Club **22**: 49. 1895.

LIMNIA PERFOLIATA (Donn) Haw. Syn. Pl. Succ. 11. 1812.

Claytonia perfoliata Donn, Ind. Hort. Cantab. 25. 1796. — Willd. Sp. Pl. **1**: 1186. 1798.

Limnia depressa (A. Gray) Rydb.

Claytonia parviflora depressa A. Gray, Proc. Am. Acad. **22**: 281. 1887.

Limnia parviflora (Dougl.) Rydb.

Claytonia parviflora Dougl.; Hook. Fl. Bor. Am. **1**: 225. 1832.

At least two of the species of *Claytonia* transferred to *Montia* are, however, so unlike the rest that they can not very well be included in *Limnia*, but are better regarded as types of distinct genera.

CRUNOCALLIS Rydb. gen. nov.

Procumbent or decumbent water or mud-plants, rooting at the nodes and producing long runners, which develop small globose cormlets at the apex. Leaves several pairs, opposite. Sepals two, nearly equal. Corolla regular. Petals 5, similar and equal. Stamens 5. Ovary 3-ovuled. Capsule 1–3-seeded. Seeds granular-muriculate.

This genus has the flowers of *Claytonia*, but the general habit of *Montia;* the mode of propagation and the seeds are different from both.

Crunocallis Chamissonis (Ledeb.) Rydb.

Claytonia Chamissoi Ledeb.; Spreng. Syst. **1**: 790. 1825.

NAIOCRENE (T. & G.) Rydb. gen. nov.

Claytonia § *Naiocrene* T. & G. Fl. N. Am. **1**: 201, in part. 1838.

Sarmentose, spreading or decumbent plants, with alternate fleshy leaves, bearing bulblets in their axils. Sepals very unlike, one broad and 2-lobed at the apex. Corolla regular or nearly so. Stamens 5. Ovary 3-ovuled. Seeds 1-3, shining.

Naiocrene parvifolia (Moç.) Rydb.

Claytonia parvifolia Moç.; DC. Prodr. **3**: 361. 1828.

EROCALLIS Rydb. gen. nov.

Perennials with globular corms. Radical leaf usually solitary, not present at flowering time. Stem low, with 2 or 3

whorled leaf-like bracts. Sepals 2, somewhat unequal. Petals 3–10, oblong. Capsule oblong-conical, circumscissile.

The genus is closely related to *Claytonia*, and the only distinctive character is the circumscissile capsule. Howell included it in *Oreobroma* and Robinson in *Lewisia;* in both genera, especially the latter, it is out of place on account of its habit.

Erocallis triphylla (S. Wats.) Rydb.

Claytonia triphylla S. Wats. Proc. Am. Acad. **10**: 345. 1875.

Alsinopsis propinqua (Richardson) Rydb.

Arenaria propinqua Richardson, Franklin Journey 738. 1823.

Arenaria verna hirta S. Wats. Bot. King Exp. 41. 1871. Not *A. hirta* Wormskj.

Arenaria verna (a)equicaulis A. Nels. Bull. Torrey Club **26**: 352. 1899.

Alsinopsis Rossii (Richardson) Rydb.

Arenaria Rossii Richardson, Franklin Journey 738. 1823.

Alsinopsis quadrivalvis (R. Br.) Rydb.

Arenaria quadrivalvis R. Br. in Parry 1st Voy. app. cclxxi. 1824.

Alsinopsis obtusiloba Rydb.

Arenaria obtusa Torr. Ann. Lyc. N. Y. **2**: 170. 1827. Not *A. obtusa* All. 1785.

Arenaria biflora S. Wats. Bibl. Index 94. 1878. Not *A. biflora* L. 1767.

Arenaria sajanensis Robinson, Proc. Am. Acad. **29**: 304. 1894. Not *A. sajanensis* Willd. 1816.

Delphinium reticulatum (A. Nels.) Rydb.

Delphinium occidentale reticulatum A. Nels. Bull. Torrey Club **27**: 261. 1900.

ODOSTEMON Raf. Am. Monthly Mag. **2**: 265. F 1818.

Mahonia Nutt. Gen. Am. **1**: 211. 1818.

Both *Odostemon* Raf. and *Mahonia* Nutt. were published in the same year, but the former a few months earlier. The Rocky Mountain species are:

Odostemon Aquifolium (Pursh) Rydb.

Berberis Aquifolium Pursh, Fl. Am. Sept. 219. 1814.
Berberis repens Lindl. Bot. Reg. *pl. 1176.* 1828.
Berberis nana Greene, Pittonia **3**: 98. 1896.

Odostemon nutkanus (DC.) Rydb.

Mahonia Aquifolium nutkana DC. Syst. **2**: 20. 1821.
Berberis Aquifolium Lindl. Bot. Reg. *sub pl. 1176.* 1828.

Odostemon nervosus (Pursh) Rydb.

Berberis nervosa Pursh, Fl. Am. Sept. 219. 1814.

Odostemon Fremontii (Torr.) Rydb.

Berberis Fremontii Torr. Bot. Mex. Bound. 30. 1859.

Lepidium crenatum (Greene) Rydb.

Thelypodium crenatum Greene, Pittonia **4**: 20. 1899.

The species was described from flowering specimens, but the ovaries or young fruit were developed enough to indicate the true genus. Dr. Greene was probably led astray by the fact that the specimens were labeled *Thelypodium integrifolium.*

Erysimum asperrimum (Greene) Rydb.

Cheiranthus asperrimus Greene, Pittonia **3**: 133. 1896.
Erysimum pumilum Rydb. Mem. N. Y. Bot. Gard. **1**: 189. 1900.

In my Flora of Montana I took up Nuttall's *E. pumilum* for this species. This was evidently an error into which I was led by Dr. Greene's discussion in Pittonia, *loc. cit. E. pumilum* Nutt. remains as yet unknown, but from the description it must be a close relative of *E. nivale* and *E. radicatum*, if not one of these species.

Erysimum Bakeri (Greene) Rydb.

Cheiranthus aridus Greene, Pittonia **4**: 198. 1900. Not *C. aridus* A. Nelson. 1899.
Cheiranthus Bakeri Greene, Pittonia **4**: 235. 1901.

Erysimum argillosum (Greene) Rydb.

Cheiranthus argillosus Greene, Pittonia **3**: 136. 1896.

Erysimum amoenum (Greene) Rydb.

Cheiranthus nivalis amoenus Greene, Pittonia **3**: 137. 1896.

Lesquerella stenophylla (A. Gray) Rydb.

Vesicaria stenophylla A. Gray, Bost. Jour. Nat. Hist. **6**: 149. 1850.

This was included in *L. Fendleri* by Dr. Watson, but I think it well distinct.

Euklisia crassifolia (Greene) Rydb.

Streptanthus crassifolius Greene, Pittonia **3**: 227. 1897.

Dr. Greene in Leaflets (**1**: 81–85. D 1904) took up *Euklisia* of Nuttall, only changing its spelling, but he overlooked that it had already been proposed as a genus in Dr. Small's Flora of the Southeastern United States. About three years ago I intended to publish it as a genus, making *Streptanthus cordatus* Nutt. the type. Unfortunately my notes were never published and forgotten. Dr. Small, who had seen them, took up the name in his flora, giving me the credit for the same. As he published only one species, *E. hyacinthoides*, this becomes the type. Dr. Greene took up the name for a group, to which neither Dr. Small's type nor my intended type (which I also think was Nuttall's) belong. If *Streptanthus* should be split up into as many genera as Dr. Greene suggests, neither his species of *Euklisia* nor those known to Nuttall would fall within *Euklisia*. My intention was only to divide the genus into two genera, *Streptanthus* and *Euklisia*. So limited the latter genus will contain the Rocky Mountain species here given.

Euklisia cordata (Nutt.) Rydb.

Streptanthus cordatus Nutt.; T. & G. Fl. N. Am. **1**: 77. 1838.

Euklisia longirostris (S. Wats.) Rydb.

Arabis longirostris S. Wats. Bot. King Exp. 17. 1871.

Streptanthus longirostris S. Wats. Proc. Am. Acad. **25**: 127. 1890.

Peritoma Sonorae (A. Gray) Rydb.

Cleome Sonorae A. Gray, Pl. Wright. **2**: 16. 1853.

Potentilla platyloba Rydb.

Potentilla bipinnatifida platyloba Rydb. Mem. Dep. Bot. Columbia Univ. **2**: 100. 1898.

This is as distinct from *P. bipinnatifida* as most species of *Potentilla* are from their relatives.

Potentilla rubripes Rydb.

Potentilla rubricaulis Rydb. Mem. Dep. Bot. Columbia Univ. **2**: 101. 1898. Not *P. rubricaulis* Lehm. 1830.

Lehmann's species, for which I mistook this Rocky Mountain plant, is the same as *P. prostrata* Rottb.

Argentina argentea Rydb.

Argentina anserina concolor Rydb. Mem. Dep. Bot. Columbia Univ. **2**: 160. 1898. Not *Potentilla anserina concolor* Ser. 1825.

The European plant to which this was referred differs in having more deeply and more sharply toothed leaflets, and smaller flowers.

Fragaria ovalis (Lehm.) Rydb.

Potentilla ovalis Lehm. Ind. Sem. Hort. Bot. Hamb. **1849**: 9. 1849.

Fragaria firma Rydb. Mem. Dep. Bot. Columbia Univ. **2**: 184. 1898.

Dr. Wolf, of Dresden, Germany, has called my attention to the fact that *P. ovalis* Lehm. is no *Potentilla* at all. Prof. Lehmann did not cite any type, but his herbarium shows that it was *Fendler 206*, which I included in *Fragaria firma*.

Fallugia acuminata (Wooton) Rydb.

Fallugia paradoxa acuminata Wooton, Bull. Torrey Club **25**: 306. 1898.

Prunus melanocarpa (A. Nelson) Rydb.

Cerasus demissa melanocarpa A. Nels. Bot. Gaz. **34**: 25. 1902.

The common Rocky Mountain tree is well distinct from the original *Cerasus demissa* Nutt. or *Prunus demissa* Walp. The latter, which was from the Columbia Valley, has thin, very pubescent

leaves, and is more related to the eastern *P. virginiana*. *P. melanocarpa* is rather nearer the Mexican species known as *P. Copalin*, and it is sometimes very hard to distinguish it from that species.

ANISOLOTUS Bernh. Sem. Hort. Erf. 1837. — Linnaea **12**: Litt. Ber. 75. 1838.

I think that this genus, well characterized by Bernhardi, should be restored. It is well distinct from the Old World *Lotus* and from *Hosackia*. I think that Dr. Greene's merging all our North American species usually known as *Hosackia* into *Lotus* was very unfortunate, for we do not have any native species which could be included in *Lotus*, even if made broad enough to include *Tetragonolobus* and other Old World genera.

The Rocky Mountain species of *Anisolotus* are:

Anisolotus Wrightii (A. Gray) Rydb.

Hosackia Wrightii A. Gray, Pl. Wright. **2**: 42. 1853.

Anisolotus brachycarpus (Benth.) Rydb.

Hosackia brachycarpa Benth. Pl. Hartw. 306. 1848.
Lotus huministratus Greene, Pittonia **2**: 139. 1890.

Anisolotus rigidus (Benth.) Rydb.

Hosackia rigida Benth. Pl. Hartw. 305. 1848.

Aragallus Hallii (Bunge) Rydb.

Oxytropis Hallii Bunge, Mem. Acad. Sci. St. Petersb. VII. **22**[1]: 162. 1874.

Vicia dissitifolia (Nutt.) Rydb.

Lathyrus dissitifolius Nutt.; T. & G. Fl. N. Am. **1**: 277. 1838.

Lathyrus incanus (Rydb. & Smith) Rydb.

Lathyrus ornatus incanus Rydb. & Smith, Fl. Neb. **21**: 64. 1895.

Chamaesyce flabelliformis (Engelm.) Rydb.

Euphorbia petaloidea flagelliformis Engelm. Bot. Mex. Bound. 185. 1859.
Euphorbia flagelliformis Engelm. Bull. Geol. Surv. Terr. **2**: 243. 1876.

Chamaesyce rugulosa (Engelm.) Rydb.

Euphorbia serpyllifolia rugulosa Engelm.; Millsp. Pittonia **2**: 85. 1890.

Chamaesyce albicaulis Rydb.

Euphorbia albicaulis Rydb. Mem. N. Y. Bot. Gard. **1**: 266. 1900.

Tithymalus arkansanus coloradensis (Norton) Rydb.

Euphorbia arkansana coloradensis Norton, Rep. Missouri Bot. Gard. **11**: 105. 1900.

Sida sagittaefolia (A. Gray) Rydb.

Sida lepidota sagittaefolia A. Gray, Pl. Wright. **1**: 18. 1852.

Sphaeralcea marginata York, sp. nov.

Perennial, herbaceous; stem usually branching from the base, with ascending branches, 2–6 dm. tall, densely stellate-canescent; leaf-blades subrotund, rounded-ovate or subcordate, 1.5–4 cm. long, 1.5–3 cm. wide, cordate or truncate at the base, crenate or imperfectly dentate, slightly 3–5-lobed, the middle lobe acute or obtuse, the upper surface with close stellate pubescence, more densely pubescent beneath, petioles less than ½ as long as the blades or sometimes longer; flowers borne in narrow panicles; involucre of 3 small setaceous bracts: calyx-tube densely stellate-pubescent, about 3 mm. long; lobes 5, ovate, acute or acuminate, almost glabrous or sparingly stellate-pubescent on dorsal surface, densely pubescent on the margin, glabrous within, 2–3 mm. long, in fruit 4–5 mm. long; petals pink, obovate, 10–12 mm. long; carpels 10–12 in number, 3–4 mm. long, cuspidate, the lower half reticulated; ovules two; usually only one seed developed in the lower part of each carpel, upper part somewhat aborted; seeds reniform, glabrous.

In general appearance this plant resembles *Sphaeralcea Munroana* (Doug.) Spach; but in the former, the mature carpels separate from the central axis by a small thread attached to the base of each carpel, while in the latter, the carpels do not separate from the central axis by a thread. *Sphaeralcea marginata* also resembles *S. incana* Torr.; but the latter is taller, the leaves are larger, the pubescence on both sides of the leaves is much denser and finer, the paniculate clusters of flowers are longer and more open and the carpels are nearly always two-seeded.

COLORADO: Grand Junction, 1901, *C. F. Baker 93* (type); also 1893, *De Alton Saunders;* McElmo Cañon, 1901, *F. K. Vreeland 860.*

NEW MEXICO: 1901, *F. K. Vreeland 823.*

Cactus similis (Engelm.) Rydb.

Mamillaria similis Engelm. Bost. Jour. Nat. Hist. **5**: 246. 1845.
Mamillaria missouriensis caespitosa S. Wats. Bibl. Index 403. 1878.

Echinocereus aggregatus (Engelm.) Rydb.

Mamillaria aggregata Engelm. in Emory, Notes Recon. 157. 1848.
Echinocereus coccineus Engelm. Wisliz. Rep. 9. 1848. Not *E. coccineus* DC.
Cereus phoeniceus Engelm. Proc. Am. Acad. **3**: 284. 1856.

Echinocereus Roemeri (Muhlenf.) Rydb.

Cereus Roemeri Muhlenf. Allg. Gart. Zeit. **16**: 19. 1848.
Cereus conoideus Engelm. Pac. R. R. Rep. **4**: 35. 1856.

Epilobium adenocladon (Haussk.) Rydb.

Epilobium paniculatum adenocladon Haussk. Mon. Gatt. Epil. 247. 1884.

Anogra latifolia Rydb.

Oenothera pallida latifolia Rydb. Contr. U. S. Nat. Herb. **3**: 159. 1895.

Pachylophus marginatus (Nutt.) Rydb.

Oenothera marginata Nutt.; Hook. & Arn. Bot. Beechey 342. 1838.
Oenothera idahoensis Mulford, Bot. Gaz. **19**: 117. 1894.

Sphaerostigma pubens (S. Wats.) Rydb.

Oenothera strigulosa pubens S. Wats. Proc. Am. Acad. **8**: 594. 1873.

Sphaerostigma minutiflora (S. Wats.) Rydb.

Oenothera alyssoides minutiflora S. Wats. Proc. Am. Acad. **8**: 591. 1873.

CORNELLA Rydb. gen. nov.

The type of the genus *Cornus* L. is *C. mas* L. which has no congener in this country, except perhaps *C. sessilis* Torr. of California. Opiz segregated from *Cornus* the genus *Svida*, to which the European *C. sanguinea* and most of our American cornels belong. Rafinesque in his Alsographia Americana made the genus *Cynoxylon* based on *C. florida* L., and also another genus (or subgenus) *Eukrania* in which he placed *C. canadensis* L. and *C. suecica* L. Unfortunately he made *C. mascula* of Europe, which is congeneric with and some claim the same as *C. mas* L., the type, and *C. canadensis* and *C. suecica* have no available generic name, unless they are included with *C. florida* and *C. Nuttallii* in *Cynoxylon*. Outside of the great difference in habit and fruit between the Dwarf Cornels and the Flowering Dogwoods, the former have one character not found in any of the groups usually included in *Cornus*. The sepals of the Dwarf Cornels have a small horn-like, at last deciduous, spine on the back near the apex. This, together with the peculiar habit, makes them deserve generic rank.

Cornella canadensis (L.) Rydb.

Cornus canadensis L. Sp. Pl. 118. 1753.

Cornella suecica (L.) Rydb.

Cornus suecica L. Sp. Pl. 118. 1753.

Cornella unalaschkensis (Ledeb.) Rydb.

Cornus unalaschkensis Ledeb. Fl. Ross. **2**: 378. 1844.

Pseudocymopterus multifidus Rydb.

Pseudocymopterus montanus multifidus Rydb. Bull. Torrey Club **31**: 574. 1904.

Pseudocymopterus purpureus (C. & R.) Rydb.

Pseudocymopterus montanus purpureus C. & R. Rev. N. Am. Umbell. 75. 1888.

Pseudocymopterus tenuifolius (A. Gray) Rydb.

Thaspium montanum tenuifolium A. Gray, Pl. Wright. **2**: 65. 1853.

Ligusticum montanum tenuifolium S. Wats. Bibl. Index 426. 1878.

Vaccinium oreophilum Rydb.

Vaccinium myrtilloides S. Wats. Bot. King Exp. 209. 1871. Not *V. myrtilloides* Michx. 1803.

Vaccinium Myrtillus A. Gray, Syn. Fl. **2**[1]: 24. 1878. Not *V. Myrtillus* L. 1753.

The American plant has depressed globular-ovoid corolla, fully as wide as long, while the original European *V. Myrtillus* has ovoid-urceolate corolla, decidedly longer than broad.

Androsace subulifera (A. Gray) Rydb.

Androsace septentrionalis subulifera A. Gray, Syn. Fl. **2**[1]: 60. 1878.

Dodecatheon sinuatum Rydb.

Dodecatheon radicatum sinuatum Rydb. Bull. Torrey Club **31**: 631. 1904.

Erythraea arizonica (A. Gray) Rydb.

Erythraea calycosa arizonica A. Gray, Syn. Fl. **2**[1]: 113. 1878.

Anthopogon elegans (A. Nels.) Rydb.

Gentiana elegans A. Nels. Bull. Torrey Club **25**: 276. 1898.

Anthopogon barbellatus (Engelm.) Rydb.

Gentiana barbellata Engelm. Trans. Acad. St. Louis **2**: 216. 1863.
Gentiana Moseleyi A. Nels. Bot. Gaz. **31**: 396. 1901.

Amarella monantha (A. Nels.) Rydb.

Gentiana tenella A. Gray, Syn. Fl. **2**[1]: 117, in part. 1878.
Gentiana monantha A. Nels. Bull. Torrey Club **31**: 244. 1904.

Amarella plebeia Holmii (Wettst.) Rydb.

Gentiana plebeia Holmii Wettst. Oester. Bot. Zeitsch. **50**: 195. 1900.

Dasystephana Romanzovii (Ledeb.) Rydb.

Gentiana Romanzovii Ledeb.; Bunge, Nouv. Mém. Soc. Nat. Mosc. **1**: 215. 1829.

Gentiana frigida A. Gray, Syn. Fl. **2**[1]: 120. 1878. Not *G. frigida* Haenke. 1788.

Dasystephana Parryi (Engelm.) Rydb.

Gentiana Parryi Engelm. Trans. Acad. St. Louis **2**: 218. 1863.

Dasystephana affinis (Griseb.) Rydb.

Gentiana affinis Griseb. Gen. et Sp. Gent. 289. 1839.

Dasystephana Forwoodii (A. Gray) Rydb.

Gentiana Forwoodii A. Gray, Syn. Fl. **2**[1]: 406. [Ed. 2.] 1886.

Dasystephana Bigelovii (A. Gray) Rydb.

Gentiana Bigelovii A. Gray, Syn. Fl. **2**[1]: 406. [Ed. 2.] 1886.

Dasystephana interrupta (Greene) Rydb.

Gentiana interrupta Greene, Pittonia **4**: 182. 1900.

Frasera scabra (M. E. Jones) Rydb.

Frasera speciosa scabra M. E. Jones, Zoe **4**: 277. 1893.

Frasera stenosepala Rydb.

Frasera speciosa stenosepala Rydb. Bull. Torrey Club **31**: 632. 1904.

Frasera angustifolia Rydb.

Frasera speciosa angustifolia Rydb. Bull. Torrey Club **31**: 632. 1904.

Phlox depressa (E. Nels.) Rydb.

Phlox multiflora depressa E. Nels. Rev. W. N. Am. Phloxes 20. 1899.

Leptodactylon Watsonii (A. Gray) Rydb.

Gilia Watsonii A. Gray, Proc. Am. Acad. **8**: 267. 1870.

Leptodactylon Nuttallii (A. Gray) Rydb.

Gilia Nuttallii A. Gray, Proc. Am. Acad. **8**: 267. 1870.

Phacelia ciliosa Rydb.

Phacelia sericea ciliosa Rydb. Bull. Torrey Club **31**: 636. 1904.

Oreocarya hispidissima (Torr.) Rydb.

Eritrichium glomeratum hispidissimum Torr. Bot. Mex. Bound. 140. 1859.

Oreocarya perennis (A. Nels.) Rydb.

Oreocarya affinis perennis A. Nels. Erythea **7**: 67. 1899.

Mertensia platensis Rydb.

Mertensia polyphylla platensis Rydb. Bull. Torrey Club **31**: 638. 1904.

Agastache pallidiflora (Heller) Rydb.

Brittonastrum pallidiflorum Heller, Bull. Torrey Club **26**: 621. 1899.

Brittonastrum Greenei Briquet, Ann. Conserv. & Jard. Genève **6**: 157. 1902.

Madronella parvifolia (Greene) Rydb.

Monardella parvifolia Greene, Pl. Baker. **3**: 22. 1901.

Madronella dentata Rydb.

Monardella dentata Rydb. Bull. Torrey Club **31**: 641. 1904.

Mentha Penardi (Briquet) Rydb.

Mentha arvensis Penardi Briquet, Bull. Herb. Boiss. **3**: 215. 1895.

Androcera rostrata (Dunal) Rydb.

Solanum rostratum Dunal, Hist. Sol. 234. 1813.

Androcera lobata Nutt. Gen. Am. **1**: 129. 1818.

Pentstemon unilateralis Rydb. nom. nov.

Pentstemon secundiflorus A. Gray, Syn. Fl. **2**[1]: 263. 1878. Not *P. secundiflorus* Benth.

In Proc. Am. Acad. **6**: 61, Dr. Gray gives *P. secundiflorus* as a synonym of *P. acuminatus* Benth. This was correct as far as Dr. Gray's conception of the latter is concerned. Dr. Gray included in *P. acuminatus* at least four different plants. Of these, two have very broad rounded clasping and abruptly acuminate upper leaves,

viz.: the original *P. acuminatus* Dougl. and my *P. cyathophorus;* and two with lanceolate upper leaves, viz.: *P. Fendleri* A. Gray and the original *P. secundiflorus* Benth. Frémont's plant, the type of the latter, is in the Torrey herbarium. On the sheet is written in Dr. Gray's own handwriting: "This is only *P. acuminatus*, Dougl.; small. A. G. 1862." Dr. Gray afterwards transferred the name *P. secundiflorus* to an entirely different plant, describing it in the Synoptical Flora. This therefore needs a new name.

Pentstemon angustifolius caudatus (Heller) Rydb.

Pentstemon caudatus Heller, Minn. Bot. Stud. **2**: 34. 1898.

P. caudatus Heller is in my opinion the southern more luxuriant and broad-leaved form of *P. angustifolius*. The two grade absolutely into each other in Colorado.

Pentstemon trichander (A. Gray) Rydb.

Pentstemon barbatus trichander A. Gray, Proc. Am. Acad. **11**: 94. 1876.

This, as well as *P. Torreyi* Benth., I think should be kept distinct from *P. barbatus* (Cav.) Nutt. of Mexico.

MYZORRHIZA Phil. Linnaea **29**: 36. 1857.

The NOTHAPHYLLON subgenus of *Aphyllon* as limited in Gray's Synoptical Flora has been shifted back and forth between the genera *Phelipaea*, *Anoplanthus* and *Aphyllon*, and has lately been restored to *Orobanche*, where its original species were described. The typical species of *Orobanche* have a bilabiate calyx, while the species here discussed have a 5-parted one. As far as I find, the only genus described to which they can be referred is the one given above. The following two species are found in Colorado:

Myzorrhiza ludoviciana (Nutt.) Rydb.

Orobanche ludoviciana Nutt. Gen. Am. **2**: 58. 1818.

Aphyllon ludovicianum A. Gray, Bot. Calif. **1**: 585. 1876.

Myzorrhiza multiflora (Nutt.) Rydb.

Orobanche multiflora Nutt. Jour. Acad. Nat. Sci. Phila. II. **1**: 179. 1848.

Aphyllon multiflorum A. Gray, Bot. Calif. **1**: 585. 1876.

Galium subbiflorum (Wieg.) Rydb.

Galium trifidum subbiflorum Wieg. Bull. Torrey Club **24**: 399. 1897.

Distegia involucrata (Richardson) Rydb.

Xylosteum involucratum Richardson, Frankl. Journey 733. 1823.
Lonicera involucratum Banks; Spreng. Syst. **1**: 759. 1825.
Distegia nutans Raf. New Fl. Am. **3**: 21. 1836.

Chrysothamnus serrulatus (Torr.) Rydb.

Linosyris serrulata Torr.; Stansbury, Expl. 389. 1852.
Chrysothamnus glaucus A. Nelson, Bull. Torrey Club **25**: 377. 1898.

Chrysothamnus latifolius (D. C. Eaton) Rydb.

Linosyris viscidiflora latifolia D. C. Eaton, Bot. King Exp. 157. 1871.
Bigelovia Douglasii latifolia A. Gray, Proc. Am. Acad. **8**: 646. 1873.

Isocoma Wrightii (A. Gray) Rydb.

Linosyris Wrightii A. Gray, Pl. Wright. **1**: 95. 1852.
Bigelovia Wrightii A. Gray, Proc. Am. Acad. **8**: 639. 1873.

OREOCHRYSUM Rydb. gen. nov.

Plants with slender horizontal rootstock, leafy, viscid-puberulent above. Involucral bracts oblong, pale, rather obscurely 1-ribbed, chartaceous or the outer foliaceous, in about three moderately unequal ranks. Rays several, short. Disc-corollas narrowly trumpet-shaped, deeply 5-toothed. Style-appendages lanceolate, longer than the stigmatic portion. Achenes angled. Pappus white or slightly tawny, of soft scabrous bristles.

When Dr. Greene made his segregations of the old genus *Aplopappus*, he transferred the type of the genus here proposed to *Solidago*, but it is just as much out of place here as among its old associations, *i. e.*, the present genus *Stenotus*. It is true that in general habit it reminds one of a group of species formerly included in *Solidago*, but now segregated as a genus *Oligoneuron* Small; the character of the involucre and the style-appendages, however, distinguish it from *Oligoneuron* as well as from *Solidago* proper.

Oreochrysum Parryi (A. Gray) Rydb.

Aplopappus Parryi A. Gray, Am. Jour. Sci. II. **33**: 239. 1862.
Solidago Parryi Greene, Erythea **2**: 57. 1894.

Solidago pallida (Porter) Rydb.

Solidago speciosa pallida Porter, Bull. Torrey Club **19**: 130. 1892.

Solidago scabriuscula (Porter) Rydb.

Solidago canadensis scabra T. & G. Fl. N. Am. **2**: 224. 1842. Not *S. scabra* Willd.
Solidago canadensis scabriuscula Porter, Mem. Torrey Club **5**: 318. 1894.

Solidago gilvocanescens Rydb.

Solidago canadensis gilvocanescens Rydb. Contr. U. S. Nat. Herb. **3**: 162. 1895.

Aster polycephalus Rydb.

Aster scoparius DC. Prodr. **5**: 242. 1836. Not *A. scoparius* Nees. 1832.

Leucelene serotina (Greene) Rydb.

Leucelene ericoides serotina Greene, Pittonia **3**: 149. 1896.

Leucelene hirtella (A. Gray) Rydb.

Diplopappus ericaefolius hirtella A. Gray, Mem. Am. Acad. **4**: 69. 1849.

Erigeron Wootonii Rydb.

Erigeron cinereus var. γ A. Gray, Mem. Am. Acad. **4**: 68. 1849.

ESCHENBACHIA Moench, Meth. 573. 1794.

Conyza Less. Syn. Comp. 203, in part. 1832. Not *Conyza* (Tourn.) L. 1753.

The type of the Linnaean genus *Conyza* is *Conyza squarrosa* L. but this as well as most of the original species are now included in *Inula*. Lessing transferred the name *Conyza* to an entirely different group of plants. Dr. Greene united our North American species with some species of *Erigeron* into the genus *Conyzella* Rupr.

(1869), which is antedated by *Leptilon* Raf. (1818). Hence *Conyzella* becomes a synonym. I do not think that *Conyza Coulteri* should be included in *Leptilon*, which it resembles in habit but not in the composition of the heads. It has several relatives in Mexico and Central America as well as in the Old World. The oldest available name for these is, if I am not mistaken, *Eschenbachia* Moench.

Eschenbachia Coulteri (A. Gray) Rydb.

Conyza Coulteri A. Gray, Proc. Am. Acad. **7**: 355. 1868.

BERTHELOTIA DC. Prodr. **5**: 375. 1836.

A sericeous composite shrub of the southwestern United States has been variously referred to *Pluchea* and *Tessaria*, but is rather out of place in either genus. It was originally made a genus by itself, *Polypappus*, by America's keenest botanist, Thomas Nuttall, and I think it should have remained a genus distinct from both *Pluchea* and *Tessaria*. It has evidently a congener, however, in the desert regions of the Orient. This was described by De Candolle as *Berthelotia*.

Berthelotia sericea (Nutt.) Rydb.

Polypappus sericeus Nutt. Jour. Acad. Nat. Sci. Phila. II. **1**: 178. 1848.

Tessaria borealis "DC.;" T. & G. in Emory, Notes Recon. 143. 1848.

Pluchea borealis A. Gray, Proc. Am. Acad. **17**: 212. 1882.

Ximenesia exauriculata (Rob. & Greenm.) Rydb.

Verbesina encelioides exauriculata Rob. & Greenm. Proc. Am. Acad. **34**: 544. 1899.

PLATYSCHKUHRIA (A. Gray) Rydb. gen. nov.

Schkuhria § *Platyschkuhria* A. Gray, Am. Nat. **8**: 213. 1874.

Bahia § *Platyschkuhria* A. Gray, Syn. Fl. **2**[1]: 332. 1884.

The genus *Bahia* as limited in Gray's Synoptical Flora is a rather unnatural one. The group most unlike the rest is the one constituting the section *Platyschkuhria*, which I think deserves generic rank. I adopt the sectional name, although its etymology and form are rather bad.

Platyschkuhria integrifolia (A. Gray) Rydb.

Schkuria integrifolia A. Gray, Am. Nat. **8**: 213. 1874.
Bahia nudicaulis A. Gray, Proc. Am. Acad. **19**: 27. 1883.

Platyschkuhria oblongifolia (A. Gray) Rydb.

Bahia oblongifolia A. Gray, Proc. Am. Acad. **19**: 27. 1883.

Tetraneuris glabriuscula Rydb.

Tetraneuris glabra Greene, Pittonia **3**: 268, in part. 1898. Not *Actinella glabra* Nutt. 1841.

What *Actinella glabra* Nutt. was is not exactly known. It is not, however, the plant for which Dr. Greene adopted the name *Tetraneuris glabra*. If it is a *Tetraneuris* at all, it must be a species related to *T. Ivesiana*, *T. argentea* and *T. leptoclada*, as it is described as having stem-leaves. None of these grows near the original locality of *A. glabra*, viz., Shawnee villages on the Missouri (near Kansas City). The only species that are found within 300 miles from this station are *T. herbacea* Greene of Illinois, and *T. fastigiata* Greene and the following from central and western Kansas. None of these answers the description.

Tetraneuris stenophylla Rydb.

Perennial with a branched caudex, the branches of which are partly subterranean, 2–10 cm. long; leaves basal, very narrowly linear-oblanceolate, 2–4 cm. long, 1–2 mm. wide, strongly punctate, glabrous or with a few long hairs near the base; bases dilated and scarious-margined, only slightly long-hairy; scape 5–10 cm. long, striate, punctate and sparingly strigose; involucre about 5 mm. high and 10 mm. wide, hemispheric; bracts elliptic, obtuse; rays light-yellow, about 10 mm. long and 5 mm. wide, 3–4-toothed and 5–7-nerved.

This is closest related to *T. fastigiata* Greene, in which, however, the bases of the leaves are arachnoid-hairy and the involucres densely villous.

KANSAS: Ford County, 1891, *L. D. Ellis* (type).
COLORADO: Banks of Cimarron, 1860, *Newberry*.

CHAMAECHAENACTIS Rydb. gen. nov.

Cespitose scapiferous perennial, branching below the surface of the ground and with a woody root. Leaves all basal and simple,

coriaceous, white-strigose below, sparingly hirsute and punctate above. Involucral bracts about twelve, in two series; the inner series longer and with scarious-margined reddish tips. Corolla flesh-colored, with equal lobes. Stamens included. Style-lips broad. Achenes clavate, densely villous. Pappus of eight nearly equal scales, with prominent midrib and erose tips.

Miss Eastwood, the discoverer of the plant, referred it to *Chaenactis*, to which it is not closely related, resembling this genus only in the color of the corolla. The structure of the fruit and pappus would place it nearer *Bahia* and *Tetraneuris*. In general habit it resembles most that exceedingly rare plant described by Nuttall under the name *Bolophyta alpina*, which by Dr. Gray was tranferred to *Parthenium*.

Chamaechaenactis scaposa (Eastw.) Rydb.

Chaenactis scaposa Eastw. Zoe **2**: 231. 1891.

Rydbergia Brandegei (A. Gray) Rydb.

Actinella grandiflora glabrata Porter, in Port. & Coult. Syn. Fl. Colo. 76. 1874.

Actinella Brandegei Porter; A. Gray, Proc. Am. Acad. **13**: 373. 1878.

Rydbergia glabrata Greene, Pittonia **3**: 270. 1898.

Hymenoxys macrantha (A. Nels.) Rydb.

Picradenia macrantha A. Nels. Bot. Gaz. **28**: 130. 1899.

Hymenoxys Richardsonii macrantha Cockerell, Bull. Torrey Club **31**: 475. 1904.

Evidently Professor Cockerell was correct in uniting *Hymenoxys* and *Picradenia* under the older generic name. To his conception of species I am not willing to assent, however. In this respect I would rather agree with Dr. Greene and Prof. Aven Nelson. The changes in nomenclature of the Colorado species are here given.

Hymenoxys pumila (Greene) Rydb.

Picradenia pumila Greene, Pittonia **3**: 271. 1898.

Hymenoxys Richardsonii pumila Cockerell, Bull. Torrey Club **31**: 472. 1904.

Hymenoxys multiflora (Buckley) Rydb.

Phileozera multiflora Buckley, Proc. Acad. Nat. Sci. Phila. **1861**: 459. 1862.

Picradenia multiflora Greene, Pittonia **3**: 273. 1898.

Hymenoxys chrysanthemoides multiflora Cockerell, Bull. Torrey Club **31**: 507. 1904.

Hymenoxys multiflora Osterhoutii (Cockerell) Rydb.

Picradenia odorata Osterhoutii Cockerell, Bull. Colo. College Mus. 11 D 1903.

Hymenoxys chrysanthemoides Osterhoutii Cockerell, Bull. Torrey Club **31**: 505. 1904.

Achillea alpicola Rydb.

Achillea lanulosa alpicola Rydb. Mem. N. Y. Bot. Gard. **1**: 426. 1900.

Artemisia Scouleriana (Besser) Rydb.

Artemisia desertorum Scouleriana Besser; Hook. Fl. Bor. Am. **1**: 325. 1833.

Artemisia pabularis (A. Nels.) Rydb.

Artemisia rhizomata pabularis A. Nelson, Bull Torrey Club **27**: 34. 1900.

Artemisia viscidula (Osterhout) Rydb.

Artemisia cana viscidula Osterhout, Bull. Torrey Club **27**: 507. 1900.

Carduus filipendulus (A. Gray) Rydb.

Cirsium virginianum filipendulum A. Gray, Man. ed. 5. 273. 1880.

Cirsium filipendulum Engelm.; A. Gray, *loc. cit.*, as a synonym.

Cnicus altissimus filipendulus A. Gray, Proc. Am. Acad. **19**: 57. 1883.

Senecio Flintii Rydb. sp. nov.

Perennial with a cluster of fibrous-fleshy roots; stem about 3 dm. high, striate, sparingly arachnoid-hairy; basal leaves about 8 cm. long; blades orbicular or rounded-oval, abruptly con-

tracted into short petioles, sparingly arachnoid when young, glabrous and rather thick in age; stem-leaves lanceolate, sinuately toothed, auricled and clasping at the base, arachnoid when young; inflorescence small, with 3–6 heads, which are about 1 cm. high; bracts linear, 7–8 mm. long, abruptly acute at the apex, with a triangular black tip; rays light-yellow, broad; achenes striate, glabrous.

Related to *S. exaltatus* and *S. integerrimus*, but differing from the former in the entire basal leaves and small corymb, from the latter in the abruptly acute black-tipped bracts, and from both in the lower stature and the broader basal leaves.

SOUTHWESTERN COLORADO: *W. F. Flint.*

Senecio Harbourii Rydb. sp. nov.

Perennial with a branched caudex; stem 1–2 dm. high, striate, white-floccose, leafy; basal leaves and most stem-leaves petioled, 3–10 cm. long, densely white-floccose; blades oblanceolate or linear-spatulate, entire; uppermost stem-leaves sessile, lanceolate, 1–3 cm. long, more or less auricled at the base; inflorescence corymbiform, with 2–7 heads, which are mostly 10–15 mm. high; bracts narrowly linear, long-attenuate, light yellowish-green and slightly floccose; the calyculate ones minute, subulate; rays bright-yellow, over 1 cm. long and 2 mm. wide; achenes brown, shining, glabrous, angled.

This species is most nearly related to *S. Purshianus* and *S. canus*. From the former it differs in the large heads, longer rays and more leafy stem, and from the latter in the lower habit, narrower and always entire leaves, and the turbinate-campanulate instead of hemispheric heads. It grows in the mountains of Colorado at an altitude of 2700–4000 m., and was first collected by Hall & Harbour.

COLORADO: Mountains south of Ward, Boulder Co., July 18, 1901, *G. E. Osterhout 2424* (type); mountains between Sunshine, and Ward, 1902, *F. Tweedy 4861*; Silver Plume, Aug. 24, 1895, *C. L. Shear 4599*; also at the same date and locality, *P. A. Rydberg*.

Senecio oodes Rydb. sp. nov.

Perennial, with a stout rootstock and caudex; stem 3–4 dm. high, slightly floccose below, branched; basal leaves long-petioled, loosely villous-floccose when young, in age glabrous; petioles

4–9 cm. long; blades thick, oval, 3–6 cm. long, 1.5–4 cm. wide, rounded or obtuse at the apex, abruptly contracted below, coarsely dentate-crenate with triangular-ovate, obtuse teeth; lower stem-leaves similar, the petioles with enlarged toothed or lobed stipule-like bases; the upper short-petioled and narrower; inflorescence corymbiform; heads many, about 1 cm. high; bracts linear, abruptly acute, 5–7 mm. long, slightly villous; rays bright-yellow, 10–12 mm. long, about 2 mm. wide; achenes glabrous, round-angled.

This is perhaps most closely related to *S. cymbalarioides*, but differs in the stouter, more branched and more leafy stem and the large ample stem-leaves. It grows in the higher mountains of Colorado.

COLORADO: Mt. Harvard, 1896, *F. E. Clements 39* (type); Robinson, Aug. 23, 1896, *C. L. Shear 3333*.

Senecio Tracyi Rydb.

Perennial with a short rootstock; stem about 4 dm. high, glabrous; basal leaves glabrous, long-petioled; petioles 3–10 cm. long, slender; blades round-oval or oval, thin, 1.5–5 cm. long, 1–3 cm. wide, entire or merely wavy, rounded at the apex, rounded, truncate or subcordate at the base; stem-leaves lanceolate, acuminate, 2–6 cm. long or the uppermost still smaller, sinuate-crenate, the lower cuneate at the base, the upper auriculate-clasping; inflorescence a small compact cyme; heads 8–11, broadly turbinate, 6–7 mm. high; bracts linear, abruptly acute, glabrous, the calyculate ones subulate, sparingly arachnoid; rays yellow, 6–8 mm. long, about 2 mm. wide.

The species belongs to the *S. aureus* group and is somewhat intermediate between *S. crocatus*, *S. pyrrochrous* and *S. fedifolius*. From the two first it differs in the paler rays and the form of the stem-leaves and from the last in the much larger size and the presence of rays. It grows at an altitude of 3150 m.

COLORADO: Bob Creek, west of Mt. Hesperus, July 1, 1898, *Baker, Earle & Tracy 276*.

Senecio turbinatus Rydb. sp. nov.

Perennial with a cespitose rootstock; stem scapiform, about 1.5 dm. high, more or less floccose; basal leaf-blades cuneate-obovate, thick, 2–3 cm. long, 8–18 mm. wide, loosely floccose when young, dentate above the middle, rounded at the apex,

tapering below into petioles about 3 cm. long; inflorescence corymbiform; heads about 4, about 12 mm. high; involucres obconic-turbinate, floccose at the base; bracts linear, gradually acute; rays pale-yellow, 8–9 mm. long, 3 mm. wide.

This species is probably most closely related to *S. pentodontus*, but distinguished by the peculiar involucre, which tapers gradually into the peduncles.

COLORADO: Lake City, 1878, *H. N. Pease.*

Senecio multicapitatus Greenman, sp. nov.

Perennial with a thick woody root; stem 4–10 dm. high, yellowish, glabrous, branched and broom-like, leafy; leaves irregularly pinnately dissected into linear-filiform lobes, 1–1.5 mm. wide, or the upper simple and linear-filiform, somewhat fleshy, glabrous and yellowish-green; heads in a corymbiform inflorescence, numerous, almost cylindric, 7–8 mm. high, about 4 mm. in diameter; bracts 8–10, yellowish, linear, gradually acute, glabrous and shining; calyculate ones small, subulate; rays pale-yellow, 7–8 mm. long and 2 mm. wide; achenes striate, grayish strigose-hispidulous.

This species has been included in *S. Douglasii*, which has long calyculate bracts and is confined to the west coast. *S. multicapitatus* resembles closely *S. Riddellii* in habit, but differs in the narrow heads and few bracts. In *S. Riddellii* the bracts are 12–15 and the involucre campanulate. *S. multicapitatus* grows on plains and in mountain valleys of Colorado, New Mexico, and Arizona.

COLORADO: Huerfano Valley, near Gardner, 1900, *F. R. Vreeland 651;* Mt. Princeton Station, 1901, *Underwood & Selby 465.*

NEW MEXICO: Gray, Lincoln Co., *F. S. Earle & Ester S. Earle;* high plains north of El Capitan Mountains, *F. S. Earle & Ester S. Earle 388.*

ARIZONA: Holbrook, 1896, *Myrtle Zuck.*

PRENANTHELLA Rydb. gen. nov.

Low diffusely branched annuals, with numerous small heads terminating the branches. Lower leaves ample, oblong or spatulate in outline, more or less runcinate; the upper reduced and bract-like. Involucres oblong, 4–5-flowered with as many oblong bracts and 1 or 2 small calyculate ones. Achenes gradually tapering downward from the truncate summit, 4–5-ridged. Pappus of white soft capillary bristles.

The species on which this genus is based was first described as a *Prenanthes* and later transferred to *Lygodesmia*. It is so unlike the other species of *Lygodesmia* in habit, that the habit alone would suggest a distinct genus. But the best character is found in the achenes, which are ribbed and tapering downward from the summit instead of upwards from the base. The fruit agrees better with that of *Nabalus* (*Prenanthes*), but from this genus *Prenanthella* is distinguished by the habit and the structure of the involucre.

Prenanthella exigua (A. Gray) Rydb.

Prenanthes exigua A. Gray, Pl. Wright. **2**: 105. 1853.
Lygodesmia exigua A. Gray, Proc. Am. Acad. **9**: 217. 1874.

NEW YORK BOTANICAL GARDEN.

Contributions to the Mesozoic flora of the Atlantic coastal plain—I

EDWARD WILBER BERRY

(WITH PLATES 7–9)

While the present paper by no means exhausts the floral wealth of the Magothy formation, particularly within the state of Maryland, it is deemed advisable to publish it at this time in order to illustrate the remarkable floral unity of the formation, from which practically no plant-remains have hitherto been described outside the state of New Jersey. Such publication is especially necessary for the reason that while the name Magothy was proposed for these beds some years ago by Darton * it was not recognized by other geologists until republished by W. B. Clark in 1904,† its components having been previously referred to the underlying Raritan formation or to the overlying Matawan formation.

The plants are enumerated in their botanical order and include forms from the following localities: Cliffwood bluff on Raritan bay, New Jersey; the pits of the Cliffwood Brick Company near the head of Whale creek, New Jersey; near Morgan on Cheesequake creek, New Jersey; Kinkora on the Delaware river, below Trenton, New Jersey; the "Deep Cut" of the Chesapeake & Delaware canal just east of the Maryland line in Delaware; and Grove Point on the eastern shore of Chesapeake bay in Cecil county, Maryland. One or two species are included from the outcrop of the same formation on Good Hope Hill just across the Anacostia river at Washington, D. C.

The synonymy is omitted from all of the well-known but much-named species, and forms previously reported are not included in this contribution unless their range is extended.

PTERIDOPHYTA

GLEICHENIA SAUNDERSII Berry, Am. Nat. **37**: 679. *f. 1–3.* 1903.

Described originally from Cliffwood bluff; a single specimen

* DARTON, Am. Jour. Sci. III. **45**: 407–419. 1893.

† CLARK, *Ibid.* IV. **18**: 435–440. 1904.

showing a trifle more than two centimeters of a single pinnule occurs in the material from Kinkora, N. J.

GLEICHENIA ZIPPEI Heer, Fl. Foss. Arct. 1: 79. *pl. 43. f. 4.* 1868.

This species, commonly accredited with the wide range from the Neocomian through the Senonian, has been recorded recently from several Cenomanian and Senonian localities in southeastern Europe. In all probability the early and late Cretaceous forms are distinct.

In addition to Cliffwood bluff, N. J., it occurs at Deep Cut, Del.

Osmunda delawarensis sp. nov. PLATE 8, FIGURES 2–4.

Fronds pinnate; pinnae simple, alternate, long, linear-lanceolate, inequilateral at the base; borders undulate, very slightly crenulate; frond substance thick. Pinnae 7.5 cm. long, 5–6 mm. wide near the base, tapering to a long narrow point, closely resembling the sterile pinnae of *Osmunda Presliana* J. Sm. of the east and south Asiatic region, except that the latter has a narrowed base, while this species has a large base more like that in *Osmunda regalis* L.

Whether the larger specimen figured is a pinnule of a bipinnate form like the modern cosmopolitan "royal fern" it is impossible to judge from the material thus far collected.

The *Osmundaceae* are rather common and widespread in the Jurassic, represented by *Todites*, etc. Various species have been referred to *Osmunda* or *Osmundites*, including two or three forms from the lower Potomac described by Fontaine, and showing supposed fructification. Penhallow has described in detail the structure of a stem from the lower Cretaceous of Queen Charlotte Islands under the name of *Osmundites skidegatensis*, which proves beyond question the occurrence of this type of plant at this general horizon.

Without the fertile parts we cannot, of course, be positive in our identification of this form, which is quite abundant at the Deep Cut of the C. & D. canal in western Delaware.

Osmunda at the present time contains six or seven species of swamp-loving ferns, most of them confined to the northern hemisphere, where they are wide-ranging. Three of these forms occur in North America.

SPERMATOPHYTA

CONIFERALES

SEQUOIA HETEROPHYLLA Velen. Gymnosp. Böhm. Kreidef. 22. *pl. 12. f. 2–4, 6–9; pl. 13. f. 12.* 1885.

Described originally from the Cenomanian of Bohemia, this species proves to be very abundant in the mid-cretaceous of the Atlantic coastal plain, with a known range from about the latitude of New York around the southern end of the Appalachian axis to Alabama.

Recorded in abundance from the Magothy formation at the pits of the Cliffwood Brick Co., N. J., Deep Cut, Del., and Grove Point, Md.

SEQUOIA GRACILLIMA (Lesq.) Newb. Fl. Amboy Clays 50. *pl. 9 f. 1–3.* 1896.

The cones of this species, which are so common on the beach at Cliffwood bluff, N. J., have been found during the past summer at Kinkora, N. J., on the Delaware river below Trenton, and at Deep Cut, Del.

SEQUOIA REICHENBACHI (Gein.) Heer, Fl. Foss. Arct. **1**: 83. 1868.

This widespread and probably composite species has been found during the past season in the pits of the Cliffwood Brick Co., N. J., and at Deep Cut, Del.

CUNNINGHAMITES SQUAMOSUS Heer, Kreidefl. v. Quedlinb. 9. *pl. 1. f. 5–7.* 1872.

In addition to the type locality in the Senonian of Saxony, this species has been found to be one of the most abundant forms characterizing the Magothy formation, occurring at Morgan, Cliffwood bluff, and Cliffwood Brick Co., N. J., and Deep Cut, Del.

Several specimens from Morgan and Deep Cut show the spreading sparse-leaved forms, larger specimens of which from the Judith river beds have been described by Knowlton as a new species.

MORICONIA CYCLOTOXON Deb. & Ett. Urwelt. Acrobry. Aachen 59. *pl. 7. f. 23–27.* 1859.

In 1859 Debey and Ettingshausen described this species from

the Senonian of Aachen in Rhenish Prussia.* They considered it as possibly a fern of unknown affinities ("Plantae incertae sedis, filicibus affines") but could find nothing in the existing or fossil floras of the globe which matched it in venation, and they remark on its resemblance to such conifers as *Thuja*, *Thujopsis*, and *Libocedrus*.

The Swedish arctic expedition of 1870–1872 collected the same plant at Kudliset on Disco Island, and Professor Heer described it as a new species of *Pecopteris* (*P. kudlisetensis*).†

Both the Prussian and Greenland specimens were poorly preserved; subsequent collections, however, contained better material which was elaborated by Prof. Heer, who recognized the true identity of the specimens, placing them in the *Cupressineae* because of their resemblance to *Libocedrus*.‡

He corresponded with Dr. Debey to make sure of his identification, but the latter refused to admit their gymnospermous character, maintaining that certain discoid fungi which were found on some of the specimens were sori which thus established their filicean nature.

The next we hear of this species is in abundant remains from the upper Raritan clays at South Amboy, N. J., which Dr. Newberry during a European trip in 1888 compared with some of Debey's specimens. In his flora of the Amboy Clays numerous fine specimens are figured § and it is worth mentioning that the abundant and more representative collections from the lower horizons in the Raritan do not show any trace of this species which is so common at South Amboy.

In 1898 Dr. Hollick records specimens from Block Island and from Staten Island.‖

The writer has collected this species in considerable abundance, but in a rather fragmentary condition, from the Cretaceous

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* DEBEY & ETTINGSHAUSEN, Die Urweltlichen Acrobryen des Kreidegebirges von Aachen etc. Denkschr. Wien. Akad. **17**: 239 (59). *pl. 8. f. 23–27.* 1859 (presented Nov. 12th, 1857).

† HEER, Kongl. Svenska Vetenskaps-Akad. Handl. **12**: 97. *pl. 26. f. 18.* 9 O 1873.—Fl. Foss. Arct. **3²**: 97. *pl. 26. f. 18.* 1874.

‡ HEER, Fl. Foss. Arct. **6²**: 49. *pl. 33. f. 1–9.* 1882; **7**: 11. *pl. 53. f. 10.* 1883.

§ NEWBERRY, Mon. U. S. Geol. Surv. **26**: 55. *pl. 10. f. 11–21.* 1896.

‖ HOLLICK, Ann. N. Y. Acad. Sci. **11**: 57, 418. *pl. 3. f. 10; pl. 37. f. 8.* 1898.

clays near Cliffwood, N. J.* These specimens are remarkable in being about one hundred per cent. more robust than any of the former that have been figured, and invariably have the main stem covered with the usual leaves, which are wanting on the stem in most of the Greenland specimens.

Recently the writer found several characteristic specimens of this species in the Deep Cut of the Delaware & Chesapeake canal just inside the Delaware state line, thus extending the known range one hundred miles southwest from Cliffwood, N. J. The writer has also collected it recently at Grove Point on Chesapeake Bay some eighteen miles further along the strike from Deep Cut.

So many of the mid-Cretaceous forms that are common in the coastal plain flora extended around its then southern border (Tuscaloosa formation of Alabama) that it would seem as if a careful search would reveal this species as well.

With regard to the botanical affinities of this plant, its gymnospermous nature has been commonly accepted of late years, and I cannot say that I know of any valid arguments against such affinity. It seems strange, in view of the abundant remains at South Amboy and Cliffwood, that no fruits have ever been found associated with the twigs, or in a position to suggest such an association. Another anomaly is the delicate texture of some of the specimens; for instance, from Grove Point, Maryland, I have a good-sized specimen which is of the thinnest consistency, suggesting a lax thallophyte, and yet showing in detail the characteristic markings of this species, which once seen are unmistakable.

FRENELOPSIS GRACILIS Newb. Fl. Amboy Clays 59. *pl. 12. f. 1–3a.* 1896.

This species was described by Newberry from Woodbridge, N. J., and does not show an organism whose botanical relations we can be at all certain about. Some of my Maryland material, originally included under *Widdringtonites Reichii* (Ett.) Heer, is identical with Newberry's species, both probably representing the decorticated twigs of the latter which is so common in these formations.

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* BERRY, Bull. N. Y. Bot. Gard. 3: 65. *pl. 43. f. 4; pl. 48. f. 1.* 1903.—Bull. Torrey Club 31: 70. 1904.

Hollick (Bull. N. Y. Bot. Gard. **3**: 411. 1904) has reached the same conclusion, or at least suggested the same origin, for *Frenelopsis Hoheneggeri*, and the evidence seems probable enough in the case of my specimens. The *Frenelopsis* predominates at Deep Cut, Delaware, and the *Widdringtonites* predominates at Grove Point, Maryland. The Portuguese representative is *Frenelopsis leptoclada* Sap.

BRACHYPHYLLUM MACROCARPUM Newb. Fl. Amboy Clays 51 (footnote). 1896. PLATE 9.

Magnificent specimens of this species occur in the pits of the Cliffwood Brick Co., N. J., and at Deep Cut, Del. They are especially common at the latter locality.

Hollick and Jeffrey, from a study of the wood, recently announced the probable affinity of this species with the *Araucariineae*, and the publication of their investigation will be looked forward to with a great deal of interest.

JUNIPERUS HYPNOIDES Heer, Fl. Foss. Arct. **6**[2]: 47. *pl. 44. f. 3; pl. 46. f. 18.* 1882.

In washing out and picking over the lignite masses from the pits of the Cliffwood Brick Company, at which point the lignite consists of an assortment of leaves, sticks, seeds, and scales, not greatly macerated and but slightly solidified, among an abundant display of the twigs of *Sequoia Reichenbachii* (Gein.) Heer, were found perhaps a dozen fragments of twigs of a very graceful and delicate conifer which I refer to *Juniperus hypnoides* Heer.

I was at first disposed to refer these specimens to *Sequoia gracillima* (Lesq.) Newb., but further consideration has convinced me that they are identical with the twigs which Heer refers to *Juniperus*. Newberry refers somewhat similar remains, from the Raritan formation at Woodbridge, N. J., to *Juniperus macilenta* Heer. The figure which he gives is not very distinct and all that can be made out from it is that it represents a short-leaved graceful conifer. The Cliffwood material is certainly distinct from the type material of *Juniperus macilenta* Heer, which has more open and much less robust leaves than *J. hypnoides*. Also very common in the sandy clays at the Deep Cut of the C. & D. canal, Delaware.

THUJA CRETACEA (Heer) Newb. Fl. Amboy Clays 53. *pl. 10. f. 1, 1a.* 1896.

This species occurs in the Magothy formation at Grove Point, Md., and at Deep Cut, Del., and is excessively common at the latter locality.

WIDDRINGTONITES REICHII (Ett.) Heer, Fl. Foss. Arct. **6**[2]: 51. *pl. 28. f. 5.* 1882.

A very common species in the Atlantic coastal plain ranging from Greenland and Martha's Vineyard to Alabama. The new localities are Morgan, N. J., Deep Cut, Del., Grove Point and Overlook Inn road on Good Hope Hill in the District of Columbia. All of these localities are in the Magothy formation.

Picea cliffwoodensis sp. nov.

A remarkably well-preserved cone of *Picea* was collected at Cliffwood bluff and scales of apparently the same species occur in the lignite at the pits of the Cliffwood Brick Company. The principal specimen is pyritized and slightly flattened and is 8 cm. long with the apical portion missing, so that the cone in life was 10–12 cm. in length and very similar to the modern European *Picea excelsa* (Lam.) Link. Scales thin, persistent, somewhat kite-shaped, broadest across the middle and obtusely pointed, the two contained seeds rather large. Clearly referable to *Picea* and much more definite in its relations than other spruce-like fossil cones variously described as *Pinus*, *Pinites*, etc.

This species will be fully described and figured in the Report of the State Geologist of New Jersey for 1905.

GRAMINALES

CAREX CLARKII Berry, Am. Nat. **39**: 345. *f. 1.* 1905.

This species of sedge, originally collected by Dr. W. B. Clark on Grove Point, Maryland, has continued to come to light from other localities, and is a characteristic element in the flora of the Magothy formation. The remains are usually fragmentary and to that extent unsatisfactory. To the previously enumerated localities of Morgan and Cliffwood bluff, N. J., Deep Cut, Del. and Grove Point, Md., may be added Kinkora, N. J.

ARECALES

FLABELLARIA MAGOTHIENSIS Berry, Torreya **5**: 32. *f. 1, 2.* 1905.

This species was described from material collected in Delaware and Maryland, so that great interest attaches to the finding of the same form, and in considerable abundance, in the pits of the Cliffwood Brick Company in New Jersey. It thus serves to characterize the Magothy formation. The material is poor, but characteristic. The largest fragments secured are 17 cm. long and 8 cm. wide.

JUGLANDALES

JUGLANS ARCTICA Heer, Fl. Foss Arct. **6**[2]: 71. *pl. 40. f. 2; pl. 41. f. 4c; pl. 42. f. 1–3; pl. 43. f. 3.* 1882.

Heer figures a number of leaves of this species which show considerable range in size, and he includes under this name a nut which is undoubtedly referable to *Juglans*, as well as the remains of aments. His *pl. 40. f. 2* shows a much larger leaf than the rest of his specimens, doubtfully related to *Juglans* in my opinion, and looking more like the leaf of some species of *Magnolia*. With the balance of his figures our leaf agrees very well, as it does with Newberry's leaf from Woodbridge, N. J.,* and Lesquereux's leaves from Kansas.† Hollick's leaf from Long Island ‡ is a basal fragment of a much larger leaf and his Block Island reference is based upon an ament.

In some of the Dakota group leaves the secondaries are somewhat more ascending than in our specimen, but it seems to me that there can be no question as to their identity.

A rather curious point of identity is the fact that the Greenland, New Jersey and Kansas leaves are all inequilateral, additional proof, if that were necessary, that they appertain to *Juglans*. From the pits of the Cliffwood Brick Co., N. J.

MYRICALES

MYRICA LONGA (Heer) Lesq. Fl. Dakota Group 67. *pl. 3. f. 1–6.* 1892.

The Dakota group and Staten Island leaves are smaller than this leaf from Grove Point, Md., while the Arctic leaves vary con-

* NEWBERRY, Fl. Amboy Clays *pl. 20. f. 2.* 1896.

† LESQUEREUX, Fl. Dak. Group *pl. 19. f. 3; pl. 39. f. 5.* 1892.

‡ HOLLICK, Bull. Torrey Club **21**: *pl. 178. f. 2.* 1894.

siderably in size, some being larger and some smaller than the Maryland leaf, which agrees with them closely, however, in both outline and venation.

SALICALES

SALIX FLEXUOSA Newb. Later Extinct Floras 21. 1868; U. S. Geol. Surv. Mon. **35**: 56. *pl. 2. f. 5; pl. 13. f. 3, 4; pl. 14. f. 1.* 1898.

Salix proteaefolia flexuosa Lesq. Fl. Dak. Group 50. *pl. 64. f. 4, 5.* 1892. — Berry, Bull. N. Y. Bot. Gard. **3**: 67. *pl. 48. f. 12; pl. 52. f. 2.* 1903.

This small, narrow, elongate-leaved willow which Lesquereux regarded as a variety of his species *Salix proteaefolia* is very common in the Cretaceous of the Atlantic coastal plain and is particularly abundant and widespread in the Magothy formation as far as it has been explored in New Jersey, Delaware and Maryland. The forms are here restored to specific rank, as they are obviously distinct from *Salix proteaefolia* when the latter is correctly characterized. As I have discussed these forms at length in the Report of the State Geologist of New Jersey for 1905, they will not be farther considered in this place. Found in the Magothy formation at Cliffwood bluff, Cliffwood Brick Company and Morgan, New Jersey; Deep Cut, Delaware; and Grove Point, Maryland.

SALIX PROTEAEFOLIA Lesq. Am. Jour. Sci. **46**: 94. 1868. — Report on N. J. Clays 29. 1878. — Cret. Fl. 60. *pl. 5. f. 1–4.* 1874.— Cret. and Tert. Fl. 42. *pl. 1. f. 14–16; pl. 16. f. 3.* 1883. — Fl. Dakota Group 49. 1893. — Newb. Fl. Amboy Clays 66. *pl. 18. f. 3, 4.* 1896. PLATE 7, FIGURE 2.

Salix proteaefolia longifolia Lesq. Fl. Dakota Group 50. *pl. 64. f. 9.* 1893.

It is unnecessary to comment upon the forms included under this species, which are shown by the foregoing synonymy.

It occurs in the Magothy formation at the pits of the Cliffwood Brick Co., N. J., Deep Cut, Del., and Grove Point, Md.; PLATE 7, FIGURE 2 being a somewhat misleading representation in so far as the venation is shown of a specimen from the latter locality.

POPULUS (?) APICULATA Newb.; Hollick, Trans. N. Y. Acad. Sci. **12**: 4. *pl. 3. f. 2.* 1892. — Newb. Fl. Amboy Clays 65. *pl. 15. f. 3, 4.* 1896.

While I fully share Newberry's doubt as to this species being a *Populus*, I have no better suggestion to offer. Found in the Magothy formation at Deep Cut, Delaware.

URTICALES

FICUS ALIGERA Lesq. Fl. Dak. Group 84. *pl. 10. f. 3–6.* 1892.

These small oval entire leaves with winged petioles and stout midribs are rather small for this genus. The leaf-substance is thick and the venation is immersed. My collections contain several complete specimens from the pits of the Cliffwood Brick Company which do not differ from Lesquereux's type figures except that they do not show the secondary venation.

FICUS KRAUSIANA Heer, Fl. v. Moletein 15. *pl. 5. f. 3–6.* 1869.

Several characteristic fragments of this species occur in the thin layers of Magothy clay, just beneath the Matawan contact at Grove Point, Md.

FICUS WOOLSONI Newb.; Hollick, Trans. N. Y. Acad. Sci. **12**: 33. *pl. 2. f. 1, 2c.* 1892.

This rather anomalous leaf I take to be an abnormal one of this species, which is so common in the coastal plain Cretaceous. It is an especially common and variable species in the New Jersey Raritan, but has also been collected from Cliffwood bluff.

The leaf before us is ovate with truncate base and pointed apex, triple-veined. A sharp sinus divides one half of the leaf into two nearly equal rounded lobes, which give it the appearance of certain leaves from the Cenomanian of Bohemia which Velenovsky has described * as *Crotonophyllum cretaceum*, the resemblance being especially close to his figures 7 and 11 of that species.

FICUS CRASSIPES Heer, Fl. Foss. Arct. 6^2: 70. *pl. 17. f. 9a; pl. 24. f. 1, 2.* 1882.

Found in the Magothy formation at Deep Cut, Del., and Grove Point, Md.

* VELENOVSKY, Květena českého cenomanu 20. *pl. 5. f. 4–8, 10, 11.* 1889.

FICUS DAPHNOGENOIDES (Heer) Berry, Bull. Torrey Club **32**: 329. *pl. 21.* 1905. PLATE 1, FIGURE 5.

This species is a common element in the Magothy formation at Deep Cut, Del., and Grove Point, Md., as it is from other localities in the coastal plain.

PROTEALES

PERSOONIA LESQUEREUXII Knowlt. Fl. Dak. Group 89. *pl. 20. f. 10–12.* 1892.

This small rounded leaf, narrowed and somewhat produced basally, occurs in the material from the pits of the Cliffwood Brick Co., N. J. It is entirely characteristic of this species.

RANALES

NELUMBO KEMPII Hollick, Bull. N. Y. Bot. Garden **3**: 412. *pl. 74. f. 1, 2; pl. 75; pl. 76; pl. 77. f. 1.* 1904.

This species of *Nelumbo*, originally considered as related to the palms, is relatively abundant in the Cretaceous of Long Island, but has not been found elsewhere heretofore. The leaves vary greatly in size, so that I have no hesitation in referring the leaves from Morgan, N. J., to this species, although the veins are not so prominent as those of the type material are said to be. My specimens, while somewhat fragmentary, are perfectly characteristic, and denote a leaf about 16 cm. in diameter. There are sixteen rather thin radiating veins, and the remains of the thick petiole is shown pressed close against the under side of the leaf. The specimen figured shows the upper surface of the leaf and there are faint indications of secondary venation. It is quite probable that the primaries would appear considerably more prominent from the under surface were that exposed. The only other fossil *Nelumbo* from the coastal plain is *Nelumbo primaeva* Berry, from the exposure on the beach near Cliffwood, N. J., and this species I am inclined to consider as simply a young leaf of *Nelumbo Kempii*. As Hollick (*loc. cit.*) remarks, *Nelumbo Kempii* is very similar if not identical with *Nelumbium arcticum* Heer from the homotaxial Atane beds of Greenland. My specimen differs from this as well as from Hollick's material, as aforesaid, in its thinner venation. In this character the leaf from Morgan, N. J., is comparable with

Nelumbium Lakesianum and *N. tenuifolium* of Lesquereux from the Denver and Laramie respectively.

I am of the opinion, however, that this difference in venation is almost entirely dependent upon the size of the leaves.

We have in these Long Island and New Jersey specimens the earliest known record of the genus, in species whose leaves are practically indistinguishable from those of the living *Nelumbo lutea*.

MAGNOLIA AURICULATA Newb.; Hollick, Bull. Torrey Club **21**: 61. *pl. 179. f. 6, 7.* 1894.

This species is rather common in the Magothy formation at Grove Point, Md.

MAGNOLIA TENUIFOLIA Lesq. Am. Jour. Sci. **46**: 100. 1868.

PLATE 7, FIGURE 1.

Additional material more complete than that figured occurs in the Magothy formation at Deep Cut, Delaware.

Liriodendron morganensis sp. nov.

Length along the midrib 7 cm., breadth across the lower lobes 9 to 10 cm. Apical sinus deeply and broadly rounded. Lobes stout and bluntly rounded, the lower directed laterally. Midrib and petiole very stout.

Several perfect specimens were collected from the Magothy formation at Morgan, N. J., and they will be fully described and illustrated in the Report of the State Geologist of New Jersey for 1905.

CARPITES LIRIOPHYLLI Lesq. Cret. & Tert. Fl. 77. *pl. 11. f. 5.* 1883.

Unmistakable remains of this species, which was originally described from Morrison, Colorado, occur at Deep Cut, Del. They undoubtedly represent the fruit-remains of some contemporary species of *Liriodendron*.

ROSALES

Platanus Kummelii sp. nov.

Leaves large, palmately trilobate when mature, triple-veined from the base which is cuneate and entire. Margin sharply and widely serrate. Main sinuses deep and rather narrow for this genus, rounded. Petiole, midrib and lateral primaries stout. Secondaries nearly straight. Tertiary venation characteristically platanoid.

Length about 19 cm. Breadth 21 cm. These leaves are very common in the pits of the Cliffwood Brick Company, occurring both in the clays and in the lignites. With them are found abundant remains of the fruit ("button-balls"). This species will be more fully described and figured in the Report of the State Geologist of New Jersey for 1905.

Colutea obovata sp. nov. PLATE 8, FIGURES 5, 6.

Obovate, almost orbicular in general outline, inequilateral, with rounded lobes and a rather deep and broadly rounded sinus. 2.5 cm. long and about the same breadth, the broadest part being toward the apex, the lower part of the blade being wedge-shaped with curved margins. Midrib curved, rather stout; secondaries four or five on each side, sub-opposite, thin, ascending, camptodrome, leaving the midrib at an angle of about 45°. Tertiary venation very fine, but distinctly shown.

Type specimens consist of one perfect leaf and its somewhat broken counterpart from Grove Point, Maryland.

I was at first disposed to refer this handsome little leaf to *Colutea primordialis* Heer, which is so widely distributed in the American Mid-Cretaceous, but careful comparison renders such reference impossible. While the Grove Point leaf is somewhat of the same proportions as the leaf from the Dakota Group which Lesquereux refers to *C. primordialis*, still it is broader and more retuse and has fewer secondaries. In fact a comparison of Lesquereux's leaves with the type figures renders it doubtful if the Dakota Group leaves are identical with the other leaves that have been referred to this species by Heer, Newberry and Hollick. Comparing our leaf with Heer's type figures we note that the latter are larger, proportionally longer, narrower and with less rounded lobes. The Raritan leaves of Newberry are entirely dissimilar in outline and venation and are very angular looking. Hollick's leaf from the Long Island Cretaceous is rather different from Newberry's leaves, but is still less retuse and spreading than our Maryland leaf. Among the other Cretaceous species of *Colutea*, *C. Langeana* Heer is long and narrow, *C. coronilloides* Heer is narrow and has a pointed apex, *C. protogaea* Heer from Patoot shows two types of form, his *pl. 61. f. 1c* is broadest across the middle of the blade and has a restricted sinus, while his *pl. 62. f. 1c* has

a narrow sinus and an angular outline like the leaves which Newberry refers to *C. primordialis*. Probably the most similar to our species among those of the Cretaceous is *Colutea valdc-inaequalis* Heer, from Greenland, which in its general proportions is quite similar, but it is a somewhat larger leaf and has the sinus sharp instead of widely rounded.

Comparing our leaf with the various Tertiary species, it may be noted that the only American species (*C. Boweniana* Lesq.) is entirely different. With the forms from the European Tertiary, however, there is more similarity, the nearest being *Colutea macrophylla* Heer (*cf.* Fl. Tert. Helv. **3**: *pl. 132. f. 46*), while the venation of all the Swiss Miocene species (*C. Salteri*, *C. macrophylla*, *C. debilis*, and *C. antiqua*) is very close to that of the American leaf.

HYMENAEA DAKOTANA Lesq. Fl. Dakota Group 145. *pl. 55. f. 2, 3; pl. 56. f. 1, 2; pl. 62. f. 2.* 1892.

Fontaine has referred to this genus a species from the Potomac formation of Virginia, based upon the basal fragments of leaflets. It is perhaps needless to say that very little confidence can be placed in this determination. Undoubted species do occur, however, during the Mid-Cretaceous, Velenovsky having described three forms from the Cenomanian of Bohemia and Lesquereux the above species from the Dakota Group. The latter usually occurs as detached inequilateral leaflets with a rather stout curved midrib. Two of these leaflets occur in the collections from Morgan, N. J. They are somewhat smaller than the other leaves referred to this species, that of Hollick * and some of Lesquereux's being considerably larger. Judging from the figures Hollick's leaf is probably referable to the species *Phaseolites manhassettensis* recently established (Bull. N. Y. Bot. Gard. **3**: 414. *pl. 78. f. 1, 2.* 1904) by him for the reception of certain leaves from Manhasset Neck, Long Island.

Newberry's leaf (Fl. Amboy Clays 90. *pl. 41. f. 14.* 1896) and Lesquereux's *fig. 3* are identical in outline with the Morgan leaf, which appears to have been of a very delicate texture and does not show any venation characters, due undoubtedly to the rather sandy matrix. A single perfect specimen from the pits of

* HOLLICK, Bull. Torrey Club **21**: *pl. 176. f. 4.* 1894.

the Cliffwood Brick Co. is larger than the Morgan leaf and shows the long ascending camptodrome secondaries.

SAPINDALES

ILEX STRANGULATA Lesq. Ann. Rep. U. S. Geol. and Geog. Surv. Terr. **1874**: 359. *pl. 7. f. 8.* 1876.

While this leaf is not so "strangulate" as the type, it is exactly similar in all other respects. It has the same coriaceous texture, thick petiole and midrib, and the same secondary venation, particularly the marginal vein. From the pits of the Cliffwood Brick Co., N. J.

RHAMNALES

Paliurus populiferus sp. nov.

Leaf orbicular, slightly emarginate at the apex and with a decurrent base. Three-veined from the top of the petiole, which is 0.94 cm. in length. Leaf 2.5 cm. long and 3.25 cm. wide.

Found at the pits of the Cliffwood Brick Co., N. J., and will be figured in the Report of the State Geologist of New Jersey for 1905.

CISSITES CRISPUS Velen. Fl. Böhm. Kreidef. **4**: 12 (73). *pl. 4* (*27*). *f. 6.* 1885 (1887).

Doubtful specimens of this species occur at the pits of the Cliffwood Brick Co., N. J., and in iron carbonate nodules at Deep Cut, Del.

MALVALES

GREWIOPSIS FLABELLATA (Lesq.) Knowlt. Bull. U. S. Geol. Surv. **152**: 114. 1898.

Poorly represented in the material from the Magothy formation at Grove Point, Md.

Sterculia minima sp. nov.

"*Sterculia mucronata* Lesq."; Berry, Bull. N. Y. Bot. Gard. **3**: 90. *pl. 43. f. 3.* 1903.

Small 2- or 3-lobed, subcoriaceous leaves, ranging in length from 4–6 cm. Lobes narrow, pointed, ascending at an angle of somewhat less than 45°, with narrow sinuses extending about half way to the base. Lateral primaries branching from the midrib above its base and secondary venation camptodrome, but not well shown in most specimens.

Because of the well-known variability in fossil *Sterculia* leaves both from this country and abroad, the original two-lobed specimen from Cliffwood bluff was referred to Lesquereux's species cited above, and was considered to be a small bilobed form of the same species, which ordinarily bore rather larger leaves. Subsequent collections, however, at different localities far removed from Cliffwood bluff, show that these small leaves are uniform in size and may be indifferently two or three lobed, so that it seems desirable to consider them distinct from the ordinarily much larger *Sterculia mucronata* Lesq. of the west, from which it may be distinguished by its much smaller size, its less conical lobes, directed upwards instead of laterally, and the fact that in the former the leaves are palmately 3–5-lobed and the primaries are three in number and are palmately arranged from the top of the petiole.

Formation—Magothy.

Localities—Cliffwood bluff (type) and pits of Cliffwood Brick Company, N. J., Deep Cut, Del., and Grove Point, Md.

STERCULIA CLIFFWOODENSIS Berry, Bull. N. Y. Bot. Gard. **3**: 88. *pl. 43. f. 5.* 1903.

Originally described from Cliffwood bluff, N. J. A single broken fragment from Deep Cut, Del., has one lobe preserved for a distance of 10 cm., which must have given the perfect leaf much the appearance of *Sterculia lugubris* Lesq.

THYMELEALES

LAURUS HOLLICKII Berry, Bull. N. Y. Bot. Gard. **3**: 79. *pl. 52. f. 4.* 1903.

This is one of the commonest species in the Magothy formation, to which it is confined, and has been collected at Morgan and Cliffwood bluff, N. J., at Deep Cut, Del., and at Grove Point, Md.

LAURUS PLUTONIA Heer, Fl. Foss. Arct. **6**[2]: 75. *pl. 19. f. 1d, 2-4,* et seq. 1882.

This widespread mid-Cretaceous species has been found at the following localities in the Magothy formation: Morgan, Cliffwood bluff and Cliffwood Brick Co., N. J., and Grove Point, Md.

LAUROPHYLLUM ANGUSTIFOLIUM Newb. Fl. Amboy Clays 86. *pl. 17. f. 10, 11.* 1896.

Found in the Magothy formation at Cliffwood bluff, N. J., and at Grove Point, Md.

CINNAMOMUM INTERMEDIUM Newb. Fl. Amboy Clays 89. *pl. 29. f. 1–8, 10.* 1896. PLATE 7. FIGURES 3, 4.

This species ranges from New Jersey to Alabama. It is very common at the pits of the Cliffwood Brick Company in the former state and is also found at Deep Cut, Del., and Grove Point, Md. Velenovsky identifies a leaf which is very close to this species from the Cenomanian of Bohemia, where it is widely distributed, as *Aralia daphnophyllum.**

Attention is directed to the similarity which all of these leaves show to the entire forms of the modern *Sassafras.*

CINNAMOMUM HEERII Lesq. Am. Jour. Sci. **27**: 361. 1859. — Trans. Am. Phil. Soc. **13**: 431. *pl. 23. f. 12.* 1869. — Cret. Fl. 84. *pl. 28. f. 11.* 1874. — Cook's Clay Report 28, 29. 1878. — Cret. & Tert. Fl. 54. 1883. — Fl. Dak. Group 105. *pl. 15. f. 1.* 1892. — Newb. Fl. Amboy Clays 28, 29. 1896 (?). — U. S. Geol. Surv. Mon. **35**: 100. *pl. 17. f. 1–3.* 1898. — Knowlton, Ann. Rep. U. S. Geol. Surv. **21**[7]: 318. 1901. — ? Kurtz, Revista Mus. La Plata **10**: 52. 1902.

Daphnogene Heerii Lesq. Ann. Rep. U. S. Geol. & Geog. Surv. Terr. **1874**: 343. 1876.

From the number of fragments at the pits of the Cliffwood Brick Co., I judge this species to have been rather common, although much search has failed to reveal complete specimens. One of these shows a leaf of abnormal lateral growth, the midrib being abruptly bent almost at a right angle just above the point of insertion of the lateral primaries. This species differs from the typical form such as is figured in the Flora of the Dakota Group by its slightly more ovate outline and the wide angle which the lateral primaries make with the midrib. It may be distinguished from *Cinnamomum intermedium* Newb., which is common at this locality, by its thicker texture, shorter form, wider and more rounded base, and thicker veins, the latter being comparatively thin in *C. intermedium.* I have included Newberry's reference under this species although I am not absolutely certain that his forms are identical with those of Lesquereux.

* Fl. böhm Kreidef. **1**: 23. *pl. 5. f. 5–8, 10; pl. 6. f. 1–5.* 1882.

The Raritan localities enumerated by Lesquereux in Cook's Clay Report are very doubtful.

Kurtz records (*loc. cit.*) this species from the Cenomanian of Cerro Guido, Argentina, but his paper, unfortunately, is not illustrated. In view of the variety of triple-veined Lauraceous leaves still existing in the warmer parts of South America, his reference of such a leaf to this North American species seems to me to be very doubtful.

MALAPOENNA FALCIFOLIA (Lesq.) Knowlton, U. S. Geol. Surv. Bull. **152**: 142. 1898.

Litsea falcifolia Lesq. Fl. Dak. Group 97. *pl. 11. f. 5.* 1892.

Described originally from the Dakota Group of Kansas, a single specimen has thus far come to light in the collections from the pits of the Cliffwood Brick Co.

UMBELLALES

HEDERA CRETACEA Lesq. Fl. Dak. Group 127. *pl. 18. f. 1.* 1892.

A single specimen which I have correlated with this species occurs in the collections from Deep Cut, Delaware.

MYRTALES

EUCALYPTUS WARDIANA Berry, Bull. Torrey Club **32**: 47. 1905.

Characteristic remains of this species, described from Cliffwood bluff, N. J., have been found in the pits of the Cliffwood Brick Co. in that state and at Deep Cut, Del., and Grove Point, Md.

EUCALYPTUS GEINITZI Heer, Fl. Foss. Arct. **6**[2]: 93. *pl. 46. f. 12, 13.* 1882.

This species which was found to be common at Cliffwood bluff, N. J., shows remarkably perfect and characteristic specimens from Deep Cut, Delaware.

EUCALYPTUS (?) ATTENUATA Newb. Fl. Amboy Clays 111. *pl. 16. f. 2, 3, 5.* 1896.

Found in the Magothy formation at Cliffwood bluff, N. J., and Grove Point, Md.

ERICALES

ANDROMEDA NOVAE-CAESAREAE Hollick, in Newb. Fl. Amboy Clays 121. *pl. 42. f. 9–12, 28–31.* 1896.

I have four specimens of this well marked small leaf from Grove Point, two of which are perfect. They are identical with Hollick's figures from New Jersey, representing a broadly lanceolate leaf, equally pointed at both ends, with ascending curved secondaries.

ANDROMEDA PARLATORII Heer, Phyll. Crét. Nebr. 18. *pl. 1. 5.* 1866.

This well-known and widespread Cretaceous species was found at Deep Cut, Del., and Grove Point, Md.

EBENALES

DIOSPYROS ROTUNDIFOLIA Lesq. Cret. Fl. 89. *pl. 30. f. 1, 1a.* 1874.

Our leaves agree with Hollick's specimens from Long Island and with the numerous examples from Kansas figured in the Flora of the Dakota group, which are somewhat smaller than the type.

This is a common form in the pits of the Cliffwood Brick Company, N. J., at Deep Cut, Del., and at Grove Point, Md., thus becoming a characteristic species of the Magothy formation.

Sapotacites Knowltoni sp. nov. PLATE 8, FIGURE 1.

Sapotacites sp.? Lesq. Fl. Dak. Group 114. *pl. 65. f. 3.* 1892.

An oval leaf, 5.5 to 6 cm. long, round-emarginate at the apex, with full rounded margins to the base. Secondaries ascending, camptodrone, their angle of separation rather acute. This is obviously identical with the leaf figured by Lesquereux from the Dakota Group. It is about the same size as *Sapotacites retusus* Heer as it occurs in the Raritan formation, but is considerably less emarginate and is broadest across the middle and not toward the base. The basal margins are convex and not concave and the secondaries are more ascending.

This species, of which several specimens have been collected at Deep Cut, Del., is very close to *Sapotacites obovata* Velen.,* from the Cenomanian of Bohemia, the latter being somewhat larger, and narrower toward the base.

* Fl. böhm. Kreidef. **3**: 3. *pl. 3. f. 6.* 1884.

SANTALALES

Santalum Novae-Caesareae sp. nov.

Leaf oblong, about 10 cm. long and 2 cm. in greatest width. Blade gradually narrowed to the stout petiole. Tip broadly rounded and midrib stout. Secondaries leaving the midrib at an acute angle, long and ascending, finally becoming camptodrone, showing a tendency to become massed toward the base.

From Morgan and Cliffwood Brick Co., N. J.

Santalum has not hitherto been recognized in the Cretaceous of North America, and while these leaves are rather large for this genus, they appear to be identical with a number of living species of *Santalum*, notably *Santalum cognatum*, *S. ellipticum*, etc.

Material will be more fully described and illustrated in the Report of the State Geologist of New Jersey for 1905.

MARYLAND GEOLOGICAL SURVEY.

Explanation of plates 7-9

PLATE 7

FIG. 1. *Magnolia tenuifolia* Lesq., from Deep Cut, Del.
FIG. 2. *Salix proteaefolia* Lesq., from Grove Point, Md.
FIG. 3. *Cinnamomum intermedium* Newb., from Deep Cut, Del.
FIG. 4. The same, from Grove Point, Md.
FIG. 5. *Ficus daphnogenoides* (Heer) Berry, from Grove Point, Md.

PLATE 8

FIG. 1. *Sapotacites Knowltoni* Berry, from Deep Cut, Del.
FIG. 2, 3, 4. *Osmunda delawarensis* Berry, from Deep Cut, Del.
FIG. 5, 6. *Colutea obovata* Berry, from Grove Point, Md.

PLATE 9

FIG. 1, 2. *Brachyphyllum macrocarpum* Newb., from Deep Cut, Del.
FIG. 3. The same, from the pits of the Cliffwood Brick Co., N. J.

The genus Vernonia in the Bahamas

HENRY ALLAN GLEASON

In the recent Bahamian collections made for the New York Botanical Garden is abundant material representing the genus *Vernonia* and including some interesting new forms. Dr. N. L. Britton has referred them to me for study and has also given numerous valuable suggestions concerning their specific characters. The specimens cited are all in the herbarium of the New York Botanical Garden.

In 1864 Grisebach, in the Flora of the British West Indies, described a species of *Vernonia* from the Bahamas as *V. bahamensis*. Since then numerous collections have been made and the species has been mentioned frequently in literature pertaining to the islands. It is, however, an aggregate, and three related but distinct species are represented in recent collections. In addition a second type, represented by a fourth species belonging to a widely different section of the genus, has recently been collected and demands recognition as new. A widely distributed tropical species, *V. cinerea*, is introduced in New Providence Island.

Vernonia bahamensis as characterized by Grisebach has the "heads single, sessile at the top of leafy branches." The two related species resemble it to some extent in this character. The three may together be regarded as members of the section *Lepidaploa*, subsection *Scorpioideae*, in which the scorpioid cymes have been much reduced, even to a single flower as in *V. bahamensis*. Indications of this reduction are seen in *V. longifolia* Pers. with its varieties *Sintenisii* Urban and *Vahliana* Urban of the Windward Islands and Porto Rico. The internodes of the cyme are shortened, and the heads are fewer than in typical scorpioid *Vernoniae*, and the whole inflorescence but little exceeds the upper foliage leaves. This group seems to be of equal rank with *Scorpioideae foliatae*, and *Scorpioideae aphyllae*, and the name *Scorpioideae reductae* will indicate the peculiarities of its inflorescence.

The fourth species, of the section *Lepidaploa*, subsection *Paniculatae*, with corymbose peduncled heads, is entirely different from the others and finds its nearest relatives in the United States.

The five species may be separated as follows:

Herbaceous; heads corymbose, peduncled.
- Leaves ovate, pubescent. — *V. cinerea.*
- Leaves linear or oblong-linear, glabrous or nearly so. — *V. insularis.*

Frutescent; heads sessile or nearly so, single or in small cymes.
- Inflorescence of many heads; leaves of an elliptical type, broadest at or near the middle. — *V. arctata.*
- Inflorescence of few heads; leaves broadest above the middle.
  - Leaves oblanceolate, spatulate, or narrowly obovate. — *V. bahamensis.*
  - Leaves very broadly obcordate. — *V. obcordata.*

VERNONIA CINEREA (L.) Less. Linnaea **4**: 291. 1829.
Conyza cinerea L. Sp. Pl. 862. 1753.

This well-known introduced species differs from the other Bahamian forms in the ovate or ovate-oblong, petioled, undulate leaves. It belongs to the section *Tephrodes*, characterized by achenes without evident ribs. New Providence, *Earle 60.*

Vernonia insularis sp. nov.

§ *Lepidaploa, Paniculatae;* perennial by a horizontal rootstock; stem herbaceous or suffruticose, glabrous or minutely puberulent in the inflorescence, erect, 6–10 dm. high, simple or sparingly branched; leaves numerous, alternate, narrowly oblong-linear, entire, obtuse or sub-acute, mucronate, acute or narrowed at the sessile base, one-nerved or with faint lateral veinlets, green and essentially glabrous on both sides, 6–10 cm. long, 0.8–1.2 cm. wide, the upper somewhat smaller; inflorescence terminal, corymbose, lax; heads 4–25, on peduncles 0.5–4 cm. long; involucre at maturity broadly campanulate or depressed-hemispheric, about 5 mm. high; scales glabrous with membranous margins, the outer lanceolate, sharply acuminate, the inner oblong, abruptly acuminate or mucronate; achenes 2 mm. long, striate, sparsely pubescent; pappus tawny, 6 mm. long, the outer series minute.

Great Bahama, pine lands, Eight Mile Rocks, Feb. 5–13, 1905, *N. L. Britton & C. F. Millspaugh 2392a*, type, in fruit; same place and date, *N. L. Britton & C. F. Millspaugh 2392*, a more mature specimen with the achenes gone; same place, April 16–May 8, 1905, *L. J. K. Brace 3683*, young specimens only 2.5–3 dm. high, with the inflorescence just beginning to appear;

Abaco, pine lands, Marsh Harbor, Dec. 21, 1904, *L. J. K. Brace 1835*, past maturity with the achenes gone.

Abaco and Great Bahama islands, from which *V. insularis* only has been collected, are but a short distance from the east coast of southern Florida, and the nearest relative of the species may be looked for there. In leaf-habit and involucre it is not far from the Floridian *V. Blodgettii* Small, and may be connected phylogenetically with it.

Vernonia arctata sp. nov.

§ *Lepidaploa, Scorpioideae reductae;* a much-branched shrub 3–8 dm. high, stem and branches striate, thinly tomentose or glabrate, branches crowded, leafy; leaves broadly elliptic to obovate-oblong, acute or mucronate, entire, acute or obtuse at the base, pinnately veined, brown-tomentose beneath, glabrate above, 1–1.8 cm. long, 0.6–1.1 cm. broad, divaricately spreading or somewhat reflexed, on tomentose petioles 3–7 mm. long; inflorescence flattened,

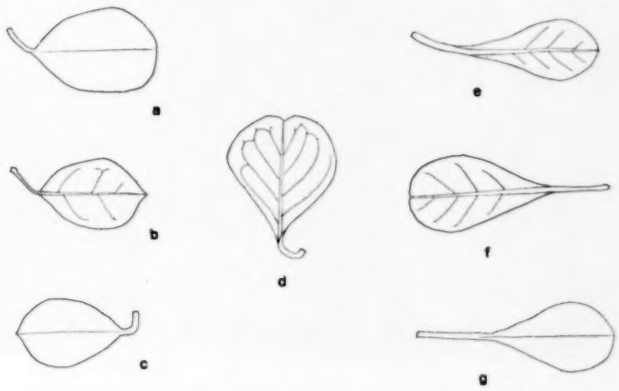

FIGURE 1. Leaf types of (*a*, *b*, *c*) *Vernonia arctata*, (*d*) *V. obcordata*, (*e*, *f*, *g*) *V. bahamensis*. Natural size.

terminating the branches, consisting of several short leafy irregular scorpioid cymes bearing each 1–5 sessile or short-peduncled heads; involucre campanulate, 4–5 mm. high; scales pauciseriate, lanceolate, irregularly imbricated, acute, tomentose; achenes about 13 in each head, pubescent, 2.5 mm. long; pappus nearly white, 5 mm. long, the outer series conspicuous.

New Providence Island, in dry pine barrens. Most of the recently collected material distributed as *V. bahamensis* belongs

here: *A. H. Curtiss 65*, Feb. 5, 1903 (type); *C. F. Millspaugh 2481*, Jan. 24, 1905: *Mrs. E. G. Britton 3275*, Feb. 3, 1905; *N. L. Britton & C. F. Millspaugh 2101*, Jan. 26, 1905; *N. L. Britton 6*, Apr. 7 and 8, 1904; *W. C. Coker 53*, June 20, 1903; *J. I. & A. R. Northrop 101*, Jan. 10, 1890; and two other sheets, in the herbarium of Columbia University, collected by Wm. Cooper.

Several branches usually arise near each other and are straight, virgate, very leafy, and about equal in length. Below the origin of the branches the leaves soon fall off. The inflores-

FIGURE 2. Habit photograph of *Vernonia bahamensis* Griseb.

ence is sometimes 8 cm. across, and always exceeds the foliage leaves when fully developed. There is some variation among the specimens in the character of the branching but it appears to be due almost entirely to the relative age of the plants as shown by the time of collection.

Vernonia arctata is distinguished from *V. bahamensis* by the shorter and broader leaves, the character of the branching, and the conspicuous inflorescence with numerous heads.

VERNONIA BAHAMENSIS Griseb. Fl. Brit. W. Ind. 352. 1864.

A repeatedly dichotomously branched bushy shrub, reaching a height of 2 m. or more, with the leaves confined mostly to the young branches. Stem flexuous, thinly tomentose; younger branches strongly angled; leaves alternate, numerous, spatulate, oblanceolate, or narrowly obovate, entire, rounded at the tip and varying from mucronate to slightly retuse, narrowed at the base into a margined petiole, pinnately veined, tomentose on both sides, especially beneath, 2–3.5 cm. long, including the petiole, 0.5–1.2 cm. wide; heads few, seldom more than four on each branch, single, sessile among the upper leaves, with 13 flowers or fewer, usually 8; involucre campanulate, 3–4 mm. high; scales ovate-lanceolate, sharply acute, loosely imbricated in few series, tomentose; achenes densely hirsute, 2–2.5 mm. long; pappus nearly white, 4–5 mm. long, the outer series conspicuous.

Fortune Island, *Eggers 3832*, Apr. 2, 1888; Inagua, *Nash & Taylor 1017*, Oct. 14, 1904, and *1344*, Oct. 28, 1904.

Notes accompanying the specimens indicate that it grows in the so-called white lands, has purple flowers, and is locally known as white sage; the photograph, for which I am indebted to Mr. G. V. Nash, shows the general character of the plant.

The last cited specimen has been compared with the original collections in the Kew Herbarium, and pronounced identical by Sir William Dyer, and later also by Dr. N. L. Britton. Fortune Island and Inagua Island are near the southern end of the Bahamian archipelago, and the latter is not far from Haiti. As indicated by the specimens at hand, *V. bahamensis* and *V. arctata* are distinct not only in structure but also in geographical distribution.

Vernonia obcordata sp. nov.

§ *Lepidaploa, Scorpioideae reductae;* a much-branched shrub 6–9 dm. high, with stiff crooked branches, bearing leaves only on the young shoots; young branches strongly angled and tomentose, becoming terete and glabrous with age; leaves numerous, crowded, broadly obcordate, entire, narrowed at the base into a petiole 5 mm. long, pinnately veined, closely gray tomentose on both sides, especially beneath, blade 0.8–1.5 cm. long, 0.7–1.5 cm. wide, the cordation at the apex 2–3 mm. deep; heads few, single, sessile among the upper leaves, 8–13-flowered; involucre campanulate, 4–5 mm. high; scales ovate-lanceolate, acute, irreg-

ularly and loosely imbricated, tomentose; achenes as in *V. bahamensis*; pappus yellow.

Little Inagua, *Nash & Taylor 1206*, Oct. 20, 1904.

Vernonia obcordata is distinguished at once from the related species by the obcordate leaves, as broad as long, and by the yellow pappus.

NEW YORK BOTANICAL GARDEN.

American ferns — VI. Species added to the flora of the United States from 1900 to 1905

Lucien Marcus Underwood

Since the beginning of the serious study of our native ferns, there has probably been no similar period in which so many additions have been made to our flora as in the five years just passed. This has been due to several causes, the most important of which is the opening up to exploration of the really tropical portion of southern Florida, with the consequent addition of a large number of species mostly more or less common in the lowlands of the Bahamas and the Antilles. Some of the additions are due to the closer analysis which has been given in recent years to certain genera, particularly *Selaginella* by Professor Georg Hieronymus, *Isoetes* by Mr. A. A. Eaton, and *Botrychium* by the present writer. The proper delimitation of certain species of central and southern Florida has depended on special conditions. For example, while the writer was collecting in Florida during the winter of 1890–91, two species already known from that state were found growing together in similar situations on limestone rocks. Although these ferns had been referred, the one to a West Indian species and the other to a variety of the same, on collecting these species fifteen years ago the writer felt as fully as he does now (1) that the two had full specific distinctness, and (2) that the places to which they had been assigned by the "authorities" was not the correct one. Two essential conditions, however, were then lacking to justify their separation, and the writer has waited until these conditions might be changed:

1. It was essential for accuracy to make examination of certain types in European herbaria; this has not been practicable until the past summer; and

2. It was necessary to study a large collection of West Indian species of *Asplenium* in order to delimit the boundaries of related species. This has now become possible at home, for while the Kew herbarium and the Berlin collections, including the well

known West Indian herbarium of Krug and Urban, both contain material not found in any other, the collections now accumulated at the New York Botanical Garden exceed either, or both together for that matter, in the richness and completeness of the series of West Indian ferns.

A number of the species in the following list have already been reported by Mr. A. A. Eaton, whose collections in South Florida were partly listed in the Fern Bulletin for April, 1904; others have been reported by Mr. Maxon, by Mr. Gilbert, and by the writer, in various short notes. It is thought desirable to bring these together in a single list which will supplement the last (1900) edition of *Our Native Ferns and their Allies*. It will be noted that the list contains six genera and forty-nine species from the limits of the United States, not included in that work; two of these, however, displace species already reported under other names, so that the net increase is forty-seven species. Besides these a considerable number of varieties have been described; some of these are based on mere sports like the var. *Hortonae* of *Asplenium platyneuron*, and *Pellaea atropurpurea cristata*, while others may represent something more permanent in character. No attempt has been made to list these here. Among the forty-seven species, two are plants introduced from cultivation, which have apparently become locally established. One species of *Equisetum* and four species of *Selaginella* must be placed in the list of "*Species inquirendae*," inasmuch as they are imperfectly known. Removing these two doubtful series from the list there are still forty native species which represent *bona fide* additions to our known flora. The list follows, arranged in systematic order:

OPHIOGLOSSACEAE

BOTRYCHIUM ALABAMENSE Maxon, Proc. Biol. Soc. Washington **19**: 23. 1906. (Type from Mobile, Alabama, *Dukes*.)

BOTRYCHIUM CALIFORNICUM Underw. Torreya **5**: 107. 1905.

This species is the Californian plant hitherto mistaken for *B. silaifolium* Presl. *B. occidentale* Underw. becomes a synonym of the latter species, having been based on a tall-growing form.

BOTRYCHIUM ONONDAGENSE Underw. Bull. Torrey Club **30**: 47. 1903. (Type from Onondaga county, New York, *Underwood*.

RANGE: Central New York, northern Michigan, Montana (?).

BOTRYCHIUM TENUIFOLIUM Underw. Bull. Torrey Club **30**: 52. 1903. (Type from Alexandria, Louisiana, *Hale*.)

RANGE: Southern States from Alabama to Louisiana and Missouri. Closely related to *B. obliquum* Muhl.

SCHIZAEACEAE

ACTINOSTACHYS GERMANI Fée, Mém. Foug. **11**: 123. *pl. 29. f. 3*. 1866. (Type from Guadeloupe, *Deshaies*).

This remarkable discovery of Mr. A. A. Eaton in South Florida adds a fourth member of this family to our flora, and gives to a hitherto rare and local tropical species an unexpected distribution. Like *Schizaea pusilla*, this new species, although larger, is still so inconspicuous that it would be readily passed over by any except the most careful collector of ferns, and quite likely has a much wider range than has hitherto been attributed to it. The genus is closely related to *Schizaea* but has penicillate spikes.

LYGODIUM JAPONICUM (Thunb.) Sw. Jour. Bot. Schrader **1800**[2]: 106. 1801.

Ophioglossum japonicum Thunb. Fl. Jap. 328. 1784. (Type from Japan, *Thunberg*.)

Escaped from cultivation near Thomasville, Georgia, and at several places near Mobile, Alabama, where it is growing like a wild plant. Mr. W. D. McNeill has sent me a fine series of specimens which were very naturally taken for a native species by their collector.

POLYPODIACEAE

POLYPODIUM HESPERIUM Maxon, Proc. Biol. Soc. Washington **13**: 200. 1900. (Type from Washington, *Gorman 642*.)

A segregate from *P. vulgare* which includes most or all of the forms hitherto referred to that species from the Rocky Mountains westward to the Pacific.

CAMPYLONEURUM LATUM Moore, Ind. Fil. 225. 1861. (Type from the West Indies.)

SOUTH FLORIDA: 14 miles south of Cutler, *A. A. Eaton.*

CAMPYLONEURUM COSTATUM (Kunze) Presl, Tent. Pterid. 190. 1836.

Polypodium costatum Kunze, Linnaea **9**: 38. 1835. (Type from Cuba, *Poeppig.*)

SOUTH FLORIDA: 5 miles north of Everglade, *A. A. Eaton.* Ranges also to Cuba and Jamaica.

CAMPYLONEURUM ANGUSTIFOLIUM (Sw.) Fée, Mém. Foug. **5**: 257. 1852.

Polypodium angustifolium Sw. Nov. Gen. et Sp. 130. 1788. (Type from Jamaica.)

SOUTH FLORIDA: 14 miles south of Cutler, *A. A. Eaton*, by whom it has been reported already. Ranges also to the Bahamas, Cuba, Jamaica, Hispaniola, and Porto Rico.

The four species of *Campyloneurum* now known from our flora may be distinguished as follows:

Leaves narrow, a centimeter or less wide.	*C. angustifolium.*
Leaves broad, 3–8 cm. wide or more.	
Veins obscure; texture opaque.	*C. costatum.*
Veins conspicuous.	
Leaves with a narrow wing, decurrent to near the base.	*C. Phyllitidis.*
Leaves long-stalked; areolae usually divided by a longitudinal vein.	*C. latum.*

ADIANTUM MODESTUM Underw. Bull. Torrey Club **28**: 46. 1901. (Type from Roswell, New Mexico, *Earle.*)

NEW MEXICO: Roswell, *Earle.*

ADIANTUM HISPIDULUM Sw. Jour. Bot. Schrader **1800**^{2}: 82. 1801. (Type from Australia.)

GEORGIA: Growing in a well near Thomasville, *R. M. Harper 1171.* Reported by Mr. Harper as established at this place.

A common species in cultivation and likely to become established in other favorable locations.

HYPOLEPIS REPENS (L.) Presl, Tent. Pterid. 162. 1836.

Lonchitis repens L. Sp. Pl. 1078. 1753. (Type from Martinique, based on Plumier *pl. 12.*)

This tropical fern, which becomes almost a climbing species in the West Indies, has been found in Florida by Mr. C. S. Williamson, as already reported (Torreya **3**: 18. 1903). He says of it: "It was quite abundant in the woods on the borders of Lake Apopka, which at Oakland is quite a distance from the town."

The plant resembles *Dennstaedtia* in habit, but has the indusium of *Cheilanthes*. The specimens sent by Mr. Williamson have a height of only 60 cm.

ASPLENIUM ANDREWSII A. Nelson, Proc. Biol. Soc. Washington **17**: 174. 1904. (Type from Boulder Creek, Colorado, *Andrews*.)

This new discovery from Colorado is a member of the *Adiantum-nigrum* group of *Asplenium* and is closely related to *Asplenium Adiantum-nigrum* of central and southern Europe. Among our species it will stand nearest *A. montanum*.

Asplenium verecundum Chapman in herb. sp. nov.

Rootstock short, erect or inclined, covered with more or less persistent bases of the leaf-stalks; leaves densely cespitose, bi-tripinnate, 16–40 cm. long, elliptic-lanceolate, 2.5–6 cm. wide, tapering both ways from the middle, borne on stalks 2–10 cm. long, which are smooth and brownish-purple as are also the rachises; pinnae (in larger specimens) bipinnate at base, gradually simpler outwards, or (in smaller specimens) pinnate throughout or with the basal pinnule 2–3-lobed or even divided into 2–3 segments; segments obovate or broadly oblanceolate, obtuse or rarely truncate at the apex and often mucronulate, decurrent on a narrowly winged rachis, bearing a single vein with a short sorus in or near the center; texture delicate, membranous; indusia rather broad, delicately membranous, with entire margins.

RANGE: Florida, northern, central, and southern; specimens have been examined as follows:

Jackson County: *Chapman* (type). Marion County: near Ocala, 1879, *Miss Reynolds; John Donnell Smith;* 1891, *Underwood 1810*. Scott's Spring near Ocala, 1891, *Underwood 1818*. Belleview, 1891, *Underwood 1876*. Hernando County: Istachatta, 1891, *Underwood 2001 b, 2001 c*; *Nash 1396 a*. Dade County: Biscayne Bay, 1887, *Isaac Holden;* 1888, *R. M. Monroe*. Between Cutler and Longview Point, 1903, *Small & Carter 854, 1156*. Miami, 1904, *E. G. Britton 91*.

With the original sheet of Chapman in the Columbia herbarium is a faded photograph marked "*Asplenium anchorita*, Scott's Well, near Ocala, Florida," and also "Rec'd from Miss Murray, Sept. 7, 1855." With this is a letter to Dr. Torrey from Amelia M. Murray, mentioning the collection of the fern at the above-named place. This interesting sink-hole later known as Scott's Spring, where the plant was evidently first collected, was visited in 1891 by the writer, who found the fern still growing there. It will be seen from the localities given that the plant ranges the entire length of the state. The name *anchorita* has been given as a synonym in the first edition of Chapman's Flora (page 593) and the highly appropriate name *verecundum* taken up from Chapman's herbarium was used as a *nomen nudum* in Fournier Mex. Pl. 111, in 1872. The fern is at once the most modest and the most graceful of our species of *Asplenium*.

Asplenium Curtissii sp. nov.

Rootstock short, erect or inclined; leaves 30–50 cm. long, bipinnate to tripinnatifid, lanceolate or lanceolate-ovate, 5–10 cm. wide, broadest a little above the base, the basal pinnae nearly as long as those above, borne on grayish-brown stalks 12–14 cm. long; pinnae lanceolate, in larger plants bipinnatifid, in smaller plants pinnate with 2–4-toothed or lobed closely-set pinnules; segments acute or rarely obtusish, pointed, decurrent on the rachises with a rather broad wing; veins single, or forked in the segments which are toothed, each tooth with a separate excurrent vein; sori prominent; indusia broad.

RANGE: Central Florida; specimens have been examined as follows:

Citrus County: Lake Tsala Apopka, *Curtiss 3728* (type). Marion County: near Ocala, 1879, 1883, *Miss Reynolds*. Indian Spring, 4 miles S. E. of Ocala, 1891, *Underwood 1813*. Belleview, 1891, *Underwood 1875*. Hernando County: Istachatta, 1891, *Underwood 1997, 2001, 2001 a;* 1897, *Curtiss 5683*.

The combined herbaria at the New York Botanical Garden contain seven sheets of *Curtiss 3728*, which represents the first plants collected and distributed. Two of these have a small plant of the previous species included on the same sheet, but the others are straight examples of the present species. We take pleasure in dedicating this very distinct species to Mr. Allen H.

Curtiss, whose botanical explorations in Florida have added so much to our knowledge. The species often grows in company with *Asplenium verecundum* Chapm., and we have collected the two growing together at three distinct localities. All the stations mentioned are within a circle whose radius is only twenty-five miles.

This species is readily distinguished from *Asplenium verecundum* by its shape, the lower pinnae not being reduced as in that species, by its larger size, coarser texture, and numerous other characters. It is scarcely necessary to add that the two plants have long posed under the names *Asplenium myriophyllum* or *A. rhizophyllum* either as species or varieties. *A. myriophyllum* is an entirely distinct species described originally from Jamaica. *A. rhizophyllum* (Thunb.) Kunze came originally from Dominica, and is a plant which roots from a prolonged apex as illustrated by Smith (Pl. Ic. Ined. **2**: *pl. 50*). The name, moreover, is preoccupied by *Asplenium rhizophyllum* L.

ASPLENIUM BISCAYNIANUM (D. C. Eaton) A. A. Eaton, Fern. Bull. **12**: 45. 1904.

Asplenium rhizophyllum var. *biscaynianum* D. C. Eaton, Bull. Torrey Club **14**: 97. *pl. 68*. 1887. (Type from Biscayne Bay, *Holden*.)

SOUTHERN FLORIDA. Collected at Biscayne Bay in 1887 by Isaac Holden, in 1888 by R. M. Monroe, in 1903 by A. A. Eaton, and in 1904 by E. G. Britton. Specimens of all these collections are represented in the herbaria at the New York Botanical Garden. There is a suspicion that this species may prove a hybrid of *Asplenium dentatum* L. and *A. verecundum* Chapm., both of which grow in its immediate vicinity. We agree with Mr. A. A. Eaton in recognizing this as a distinct species, nor should we differ did we know the above suspicion of hybridity to represent the truth of the matter. Species in taxonomy are the units of classification and their origin from others by variation, by hybridity, by mutation, or by any other process should have nothing to do with the simple taxonomic problem, while of the very highest interest in the biological history of the species.

ASPLENIUM MUTICUM Gilbert, Amer. Bot. **4**: 86. 1903. (Type from Bermuda.)

CENTRAL FLORIDA; also found in the Bermudas, whence it was described by Mr. Gilbert.

ASPLENIUM EROSUM L. Syst. Nat. ed. 10. **2**: 1324. 1759. (Type from Jamaica, based on Sloane, Voy. Jam. **1**: *pl. 33. f. 2.*)

CENTRAL FLORIDA: Cedar hammock, Sumpter County, 1894, *F. L. Lewton.*

This is the plant reported by Mr. Maxon in Torreya **3**: 185. 1903, and referred to a form of *A. auritum* Sw., and it represents one of the forms usually referred to that name from various West India islands. We have material similar to the Florida plant at least from Cuba, Jamaica, Hispaniola, and Porto Rico; much of the Jamaica material, however, which has been referred to *A. auritum*, is of quite a distinct type. In establishing *A. erosum*, Linnaeus based his name wholly on Sloane's plate; the plant of the present type, which agrees in every essential with Sloane's plate, must bear the name *A. erosum*, and, for the present, it will be left an open question as to whether all the so-called *A. auritum* Sw. of the West Indies and Mexico shall be merged under this name. It should be noted that Swartz cited the same plate of Sloane in establishing his *Asplenium auritum*, but in this case there is probably a specimen in Swartz's herbarium which will naturally take precedence of a cited plate in determining the type of the species. The name *Asplenium erosum* has unfortunately been used by various writers for species widely different from the one to which the name was originally given. We are fortunate to be able to get back to a real foundation for the application of the name. Sloane's plant is preserved in the British Museum.

CEROPTERIS VISCOSA (D. C. Eaton) Underw. Bull. Torrey Club **29**: 631. 1902.

Gymnogramme triangularis var. *viscosa* D. C. Eaton, Ferns of N. Am. **2**: 16. *pl. 48. f. 5.* 1880. (Type from Southern California.)

Stenochlaena Kunzeana (Presl) Underw. sp. nov.

Olfersia Kunzeana Presl, Tent. Pterid. 235. 1836 (*nomen nudum*).

Stems wide-climbing, more or less flattened, with occasional brownish scales when young, becoming smooth except for the abundant roots on the under surface; leaves 35–60 cm. or more long, oblanceolate, tapering both ways from above the middle,

pinnate, borne on stalks 8–10 cm. long; pinnae 18- (or more) jugate, those of the upper portion lanceolate, 6–12 cm. long, 10–12 mm. wide, cuneate at the base, or long-tapering to a bordered stalk, irregularly and usually coarsely dentate, acute or acuminate at the apex, those of the lower portion of the leaf gradually reduced, the lowest becoming ovate or ovate-triangular, 1–2 cm. long; rachis winged especially when young, stramineous; midrib prominent, lateral veins oblique, simple or rarely forked about 1 mm. apart; sporophyls pinnate, the pinnae 6 cm. or more long, 5 mm. wide, borne on a short (3 mm.) stalk, midvein conspicuous, lateral veins distant, simple or usually forked at the base with the branches widely diverging.

Specimens have been examined as follows:

CUBA: 1822, *Poeppig;** *Wright 973* (type, in herb. D. C. Eaton "scandente arbores *Citri* ad 10 ped. in sylvis").

HISPANIOLA: "San Domingue" without collector or nearer locality, in herb. Mus. Paris; Plaisance, *Nash & Taylor 1492.*

PORTO RICO: *Balbis, Schwanecke.*

FLORIDA: Between Cutler and Longview Camp, 1903, *Small & Carter 856, 1157;* Ross' Hammock, Dade County, *A. A. Eaton 677.* All the Florida plants seen are sterile, but have the unmistakable foliage of this species.

The genus *Stenochlaena* thus added to our flora is related to *Struthiopteris* in its dimorphous simply pinnate leaves, but lacks an indusium; the sporangia soon become confluent on the narrow pinnae of the sporophyls and on this account the genus was merged by Hooker with *Acrostichum*, with which, however, it has no natural alliance. The Florida plants scarcely represent the norm of the species and apparently are straggling plants instead of climbing ones, as in more tropical forests.

DRYOPTERIS AQUILONARIS Maxon, Bull. Torrey Club **27**: 638. 1900. (Type from Cape Nome, Alaska, *Flett.*)

ALASKA: Once collected. A near relative of *Dryopteris fragrans.*

DRYOPTERIS PITTSFORDENSIS Slosson, Rhodora **6**: 75. 1904. (Type from Pittsford, Vermont, *Slosson.*)

Described as a hybrid of *D. spinulosa* and *D. marginalis.*

* Poeppig's specimens were referred by Kunze (Linnaea **9**: 59. 1835) to *Lomaria longifolia* Kaulf. and it was on the incorrectness of this determination that Presl wrote "*Olfersia Kunzeana* (*Lomaria longifolia* Kunze *nec* Kaulf.)" in 1836 (Tent. Pterid. 235). We have seen Poeppig's plants both at Prague and Vienna.

Other specimens of the same were collected by the writer in 1890 near Cambridge, Massachusetts, as noted in our collections by Dr. Philip Dowell, who collected the same thing on Staten Island, N. Y., in 1904. The species appears to stand on about the same basis as *D. Boottii*. Until the present turma of varieties, now connected with the variable *D. spinulosa*, can be made the subjects of more serious field study than they have yet received in this country, this name may well stand.

Dryopteris stipularis (Willd.) Maxon in herb.

Aspidium stipularis Willd. Sp. Pl. **5**: 239. 1810. (Type from Martinique, citing Plumier, *pl. 23*.)

FLORIDA: Miami, *A. A. Eaton*. Specimens seen in the U. S. National Museum.

DRYOPTERIS AMPLA (H. & B.) Kuntze, Rev. Gen. Pl. **2**: 812. 1891.

Polypodium amplum H. & B. in Willd. Sp. Pl. **5**: 207. 1810. (Type from Caripe, Venezuela.)

FLORIDA: Between Cutler and Longview Camp, 1903, *Small & Carter 834, 835*. Already reported by Mr. A. A. Eaton (*cf.* Fern. Bull. **12**: 46).

This species forms a short caudex like a tree-fern; the peculiar mass of cinnamon-colored matted scales at the base of the leaf-stalks is strikingly characteristic.

MENISCIUM RETICULATUM (L.) Schkuhr, Krypt. Gewächse 5. *pl. 5*. 1804.

Polypodium reticulatum L. Syst. Nat. ed. 10. **2**: 1325. 1759. (Type from Martinique and based on Plumier's figure.)

Dryopteris reticulata Urban, Symb. Ant. **4**: 22. 1903.

FLORIDA: Alapattah near Miami, 1903. *A. A. Eaton 779*. Already reported by Mr. Eaton (*cf.* Fern Bull. **12**: 46).

The genus *Meniscium*, established by Schreber in 1791, is well characterized by its venation and sori, the latter being linear and naked and borne on cross veins connecting the lateral parallel veins which extend from the midribs to the margin forming a series of similar areolae. The validity of the genus was never questioned until Diels, in placing it in its proper tribe, in our judgment went too far by uniting it with *Nephrodium*, from which it has more recently been transferred to *Dryopteris* by Professor Urban.

Tectaria minima sp. nov.

Rootstock creeping, knotty; leaves subcespitose, with slender smooth stramineous stalks 6–18 cm. long; lamina triangular, in larger leaves broadly so, 6–10 cm. long, 3–9 cm. wide, lobed at the base or in larger leaves bearing a pair of separate pinnae which are again slightly lobed below; margin of the terminal portion deeply crenate-incised in young leaves, in age becoming more deeply incised and with pointed rather than rounded divisions; veins everywhere irregularly areolate with numerous free included veinlets; main veins slightly fibrillose; sori arranged in a somewhat irregular row on either side the main lateral veins with occasional ones in the outlying space; indusium usually circular with a slit on one side forming a narrow sinus which is more often obscured by the overlapping folds.

Specimens have been examined as follows:

FLORIDA: Hammocks between Cutler and Longview Camp, 1903, *Small & Carter 855* (type); 10–14 miles south of Cutler, *A. A. Eaton 260.*

BAHAMAS: Conch Sound, Andros, *Northrop 562a;* Near Nassau, New Providence, *A. H. Curtiss 142;* Farringdon Road, New Providence, *E. G. Britton 3198;* Abaco, *Brace 1815.*

CUBA: Yumury, *Rugel 2;* near Ibarra, *Britton & Shafer 344.*

This species has been passed over in herbaria for young forms of *Tectaria heracleifolia* (Willd.), but proves to be a distinct species differing in habit, in size, in texture, in the character of the venation, and in the indusia, which are not strictly peltate as in that larger and more common species. Small leaves resemble those of *T. coriandrifolia*, but differ (1) in being sharp-pointed instead of blunt at the apex, (2) in the longer pointed basal lobes in marked contrast with the short rounded ones of *Tectaria coriandrifolia*, and (3) in the venation. Grisebach has marked the sheet collected by Rugel as "*Aspidium fimbriatum* Willd.," but if we can trust Plumier's *plate 149* this is a species widely different and wholly unknown in our day, and one which is to be looked for in future collections from Hispaniola.

[The plant hitherto known as *Tectaria trifoliata* in Florida and the West Indies cannot henceforth bear that name. The true *Tectaria trifoliata*, based on Plumier's *plate 148*, proves to be a wholly distinct species. This was suspected by some of the earlier writers on ferns, but still others have maintained that the

discrepancies noted were due to the inaccuracy or possibly idealization of Plumier's artist. With the now abundant collections at hand from all parts of the West Indies there is no longer a doubt that we have two very excellent species and that Plumier's artist is again justified. Our Florida species (ranging throughout the West Indies) is **Tectaria heracleifolia** (Willd.). (*Aspidium heracleifolium* Willd. Sp. Pl. **5**: 217. 1810; type from Hispaniola, based on Plumier *plate 147*, which is an extreme form of the species.)

This species has uniformly peltate indusia. The true *Tectaria trifoliata* (L.) Cav. has indusia varying on the same plant from reniform with a very broad sinus to circular with a mere emargination on the side, thus breaking down the supposed distinctions between *Tectaria* and *Sagenia* as hitherto maintained. The true *T. trifoliata* ranges from Cuba (where we have collected it on El Yunque) and Porto Rico to Guadeloupe, Martinique, Dominica, St. Vincent, and Grenada. It differs in texture, form of lobes, venation, and indusia, and many of its characters were clearly portrayed in 1703 by Plumier, whose illustrations can now be easily interpreted with ample material of both species at hand.]

Tectaria coriandrifolia (Sw.).

Aspidium coriandrifolium Sw. Jour. Bot. Schrader **1800**[2]: 36. 1801. (Type from Jamaica, citing Pluk. Alm. *pl. 284. f. 5.*)

FLORIDA: 14 miles south of Cutler, 1903, *A. A. Eaton 563*. The Florida plants are smaller and somewhat less divided than the ordinary Jamaican forms, while the plants from Cuba are quite intermediate between them.

ODONTOSORIA CLAVATA (L.) J. Sm. Hist. Fil. 264. 1875.

Adiantum clavatum L. Sp. Pl. 1056. 1753. (Type from San Domingo, based on Plumier's *pl. 101. f. b.*)

Davallia clavata Sw. Syn. Fil. 123. 1806.

SOUTHERN FLORIDA: 12–20 miles south of Cutler, *A. A. Eaton*. Already reported by Mr. Eaton (*cf.* Fern Bull. **12**: 47).

The discovery of this species in Florida adds the third representative of its tribe (*Davallieae*) to our flora. The narrow truncate and almost cuneate segments make it an easily recognizable species. We have gathered the fern in Cuba, Porto Rico and

Jamaica, and it has been brought in several times from the Bahamas.

HYMENOPHYLLACEAE

DIDYMOGLOSSUM * SPHENOIDES (Kunze) Presl, Hymenoph. 23. 1843.

Trichomanes sphenoides Kunze, Linnaea **9**: 102. 1835; Die Farnkr. **1**: 215. *pl. 88. f. 2.* 1846. (Type from Peru, *Poeppig.*)

FLORIDA: Between Cutler and Longview Camp, 1903, *Small & Carter 1478.* This species was reported by A. A. Eaton under *Trichomanes* (*cf.* Fern Bull. **12**: 47). It is a common lowland species of tropical America.

DIDYMOGLOSSUM * KRAUSII (H. & G.) Presl, Hymenoph. 23. 1843.

Trichomanes Krausii H. & G. Icon. Fil. *pl. 149.* 1831. (Type from Dominica, *Kraus.*)

FLORIDA: Between Cutler and Longview Camp, 1903, *Small & Carter 1479, 1500.* Also reported by Mr. A. A. Eaton under *Trichomanes* (*cf.* Fern. Bull. **12**: 47).

EQUISETACEAE

EQUISETUM FUNSTONI A. A. Eaton, Fern. Bull. **11**: 10. 1903. (Type from San Bernardino, Southern California, *Coville & Funston 13.*)

SOUTHERN CALIFORNIA: Not very well represented in our herbaria, but a number of sheets are found in the collection at Washington.

Species inquirenda

Equisetum Ferrisii Clute, Fern. Bull. **12**: 22. 1904. (Type from Joliet, Illinois, *Clute.*)

Not seen; judging from characters given, a very doubtful species described entirely from sterile material.

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* The genus *Didymoglossum* was established by Desvaux (Ann. Soc. Linn. Paris **6**: 330. 1827), and differs from typical *Trichomanes* in the possession of a distinctly bilabiate involucre which is contracted below the mouth and bordered by the tissues of the leaf. It has been adopted by all the writers who have seriously monographed the filmy ferns since the time of Desvaux.

SELAGINELLACEAE

SELAGINELLA ACANTHONOTA Underw. Torreya **2**: 172. 1902. (Type from North Carolina, *Curtis.*)

NORTH CAROLINA: *Curtis, Williamson.*

GEORGIA: Tattnall County, *R. M. Harper 1852;* Dooly County, *R. M. Harper 1957;* Montgomery County, *R. M. Harper 1987.*

SELAGINELLA HANSENI Hieron. Hedwigia **39**: 301. 1900. (Type from Fisher's Cabin, California, *Hansen 878.*)

CALIFORNIA: Collected in Calaveras, Fresno and Butte counties.

Selaginella Parishii sp. nov.

Plants prostrate, close-creeping, and emitting rootlets throughout, much branched, with mostly short stems; stems 6–10 cm. long, mostly with short alternate branches or sometimes with more compound ones; leaves with a dorso-ventral arrangement, brownish below, bright-green above, 5–6-ranked, curved upwards and coiling over the stems when dry, broadly lanceolate, acute, ending in a point but with no terminal bristle, but with 6–20 very short marginal hairs on either side; sporophyls on the ends of short branches, scarcely differing from the leaves, forming short subquadrate strobiles; microspores orange-yellow, 40–50μ in diameter, sphero-tetrahedral, long remaining united in tetrads; macrospores yellow globose, about 350μ in diameter.

CALIFORNIA: Palm Springs, Colorado Desert, March, 1903, *C. F. Saunders* (comm. S. B. Parish); dry rocky mountains in the desert, April, 1882, *Parish 1200.*

MEXICO: Conception del Oro, Zacatecas, Aug., 1904, *Palmer 306* (type).

This species has been known to the writer as distinct for a number of years, and was mentioned in the original breaking up of the group which had passed under the name of *S. rupestris* (*cf.* Bull. Torrey Club **25**: 133. 1898), among the *species inquirendae.* Mr. Parish has more recently sent me specimens with microspores, and from Palmer's recent collections the same plant turns up from Zacatecas with both microspores and macrospores; all the above-named plants are in the herbarium of the New York Botanical Garden.

SELAGINELLA SHERWOODI Underw. Torreya **2**: 172. 1902. (Type from Macon County, North Carolina, *Sherwood.*)

NORTH CAROLINA: Macon County, 1887, *J. Donnell Smith;* 1901–2, *W. L. Sherwood.*

SOUTH CAROLINA: *J. Donnell Smith.*

SELAGINELLA SCHMIDTII Hieron. Hedwigia **39**: 292. 1900. (Type from Sachalin, *Schmidt.*)

UNALASKA: *Chamisso.* Professor Hieronymus also described a var. *Krauseorum, loc. cit.* 293, which was collected in rock fissures on the river Tlehini, Alaska, by the Krause brothers in 1882.

SELAGINELLA UNDERWOODII Hieron. Die Nat. Pflanzenf. 1^4: 714, note. 1901.

Selaginella rupestris Fendleri Underw. Bull. Torrey Club **25**: 127. 1898. (Type from Santa Fé, New Mexico, *Fendler 1024.*)

Selaginella Fendleri Hieron. Hedwigia **39**: 303. 1900. Not *S. Fendleri* Baker.

Colorado, New Mexico, and California; has been sent in by various collectors.

SELAGINELLA WALLACEI Hieron. Hedwigia **39**: 297. 1900. (Type from Oregon, *Wallace.*)

Oregon and Washington; has been sent in by recent collectors.

SELAGINELLA WRIGHTII Hieron. Hedwigia **39**: 301. 1900. (Type from New Mexico, *Wright 828.*)

Known only from its type collection.

Species inquirendae

The following species are known only from their original collections. It is perhaps better to await further collection and study before admitting them to full standing.

Selaginella montanensis Hieron. Hedwigia **39**: 293. 1900. (Type from Crossing, Montana, 1882, *Krause.*)

Selaginella Bourgeauii Hieron. Hedwigia **39**: 295. 1900. (Type from Fort Ellice, Oregon, *Bourgeau.*)

Selaginella Haydeni Hieron. Hedwigia **39**: 296. (Type from Nebraska, *Hayden;* also collected in Washington (then Oregon), *Lyall.*)

Selaginella Bolanderi Hieron. Hedwigia **39**: 300. 1900. (Type from Auburn, California, *Bolander 4511.*)

Selaginella sp.

FLORIDA: Dade County, *Small & Carter, A. A. Eaton.*

Erroneously reported by Mr. B. D. Gilbert as *Selaginella caribensis* Jenman, a species of the higher mountains of Jamaica (*cf.* Fern Bull. **13**: 74. 1905). We await a report on this interesting species from Professor Hieronymus.

Species excludenda

Selaginella Engelmanni Hieron. Hedwigia **39**: 294. 1900 = *S. densa* Rydb. and is therefore not to be included in the list except as a synonym.

ISOETACEAE

ISOETES OCCIDENTALIS Henderson, Bull. Torrey Club **27**: 358. 1900. (Type from Lake Coeur d'Alene, Idaho, *Henderson 5876.*)

Isoetes lacustris paupercula Engelm. Trans. Acad. Sci. St. Louis **4**: 377. 1882.

Isoetes paupercula A. A. Eaton, Proc. U. S. Nat. Mus. **23**: 649. 1901.

Colorado to California, Idaho, and Washington.

In accordance with the now established doctrine that *species* and not varieties are the units of classification, this name set aside under former rules should be restored. The writer wishes to record the fact that he has persistently opposed the principle of giving varietal names a standing in nomenclature since it was proposed at the Madison meeting and there voted. The pernicious effects of this principle have been fully appreciated by all who have tried it on any extensive scale.

ISOETES HETEROSPORA A. A. Eaton, Fernwort Papers 8. 1900. (Type from Jordan Pond, Mt. Desert Island, Maine, *Rand.*)

Known only from its type locality.

ISOETES HIEROGLYPHICA A. A. Eaton, Fernwort Papers 10. 1900. (Type from St. Francis Lake, Maine, *Pringle.*)

MAINE: Reported from several stations.

ISOETES GRAVESII A. A. Eaton, Fernwort Papers 14. 1900. (Type from Connecticut, *Graves, Underwood.*)

CONNECTICUT: Known from one or two ponds in western Connecticut. A fine series was collected by the writer some years ago at Tyler Pond, in Goshen, which is now in the herbarium of the New York Botanical Garden.

Species excludenda

Isoetes Harveyi A. A. Eaton, Fernwort Papers 11. 1900. (Type from Maine, *Harvey*.)

Mr. Eaton now regards this as a variety of *I. Tuckermani*, and we therefore exclude it from the list of species.

COLUMBIA UNIVERSITY.

INDEX TO AMERICAN BOTANICAL LITERATURE
(1901–1903)

The aim of this Index is to include all current botanical literature written by Americans, published in America, or based upon American material; the word America being used in its broadest sense.

Reviews, and papers which relate exclusively to forestry, agriculture, horticulture, manufactured products of vegetable origin, or laboratory methods are not included, and no attempt is made to index the literature of bacteriology. An occasional exception is made in favor of some paper appearing in an American periodical which is devoted wholly to botany. Reprints are not mentioned unless they differ from the original in some important particular. If users of the Index will call the attention of the editor to errors or omissions their kindness will be appreciated.

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